Dear SAM 82 owner,

Hereby we have the honour of delivering a service manual for your SAM 82 console. This booklet contains all the information you need to get acquainted with your SAM 82 and we recommend you to read it carefully. We want to point out that specifications can be altered during production in order to improve performance.

SAM 82 is a high quality product manufactured to satisfy high demands on quality, performance and easy operation. But not product — however carefully constructed and manufactured it may be — will give the expected results if not used and maintained correctly.

It is of utmost importance that maintenance is correctly done. We therefore recommend the use of an authorized serviceman. Please consult your local dealer or the factory direct.

We are convinced that, if you handle your SAM 82 in accordance with our instructions and recommendations, you will get all the pleasure and benefit you expect from it.

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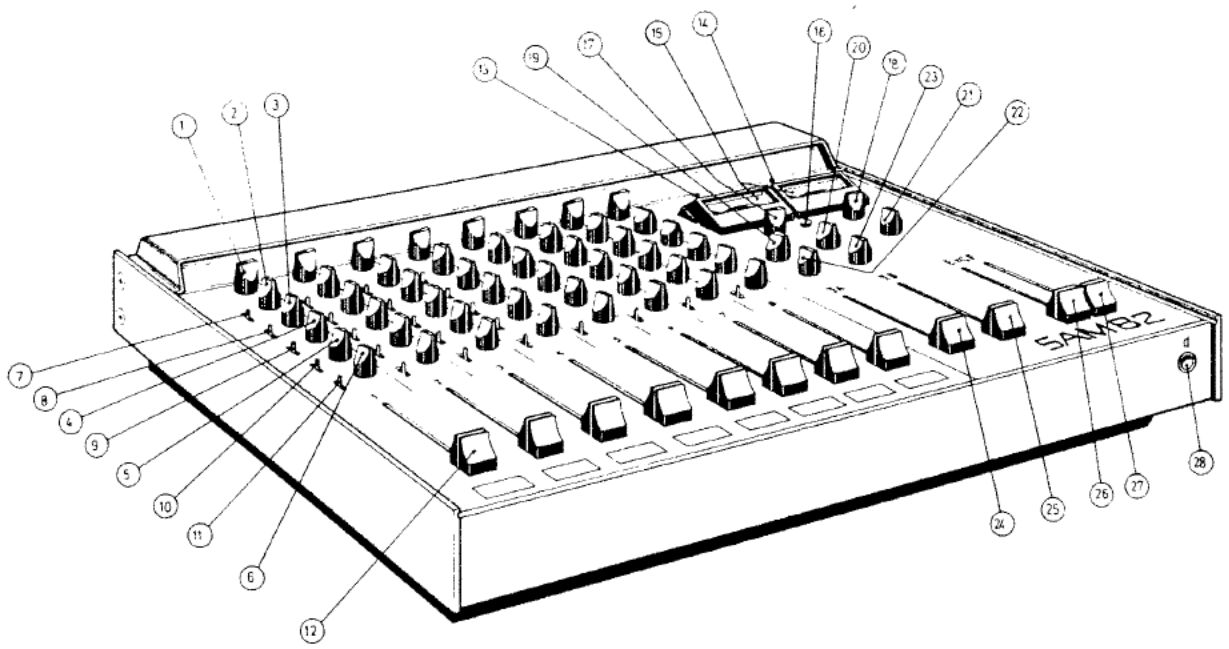
EXTERNAL VIEW



1 Gain selector: 0 dB/line, 30 40 50 60 70 dB/mic.

2 Fine gain ± 10 dB.

3 Treble equalizer ± 10 dB at 10 kHz

4 Base equalizer ± 10 dB at 100 Hz.

5 Level pot for auxiliary output D.

6 Pan potentiometer with mechanical mid-position.

7 Phase reversal switch.

8 Low cut filter 12 dB/octave at 80 or 140 Hz.

9 Selector Pre/Off/Post input fader to auxiliary output C.

10 Selector Pre/Off/Post input fader to auxiliary output D.

11 Output selector.

12 Input fader.

13 On/Off switch for 48 V condenser microphone supply.

14 Power switch/On/Off.

15 Peak programme meters.

16 Battery test button.

17 Monitor selector left.

18 Monitor selector right.

19 Master level potentiometer auxiliary output C.

20 Master level potentiometer auxiliary output D.

21 Test tone generator switch.

22 Level setting input 9 (Echo return).

23 Level setting input 10 (Echo return).

24 Master fader A.

25 Master fader B.

26 Monitor fader E.

27 Monitor fader F.

28 Earphone outlet.

SYMBOLS

= Phase reversal

= Low cut filter

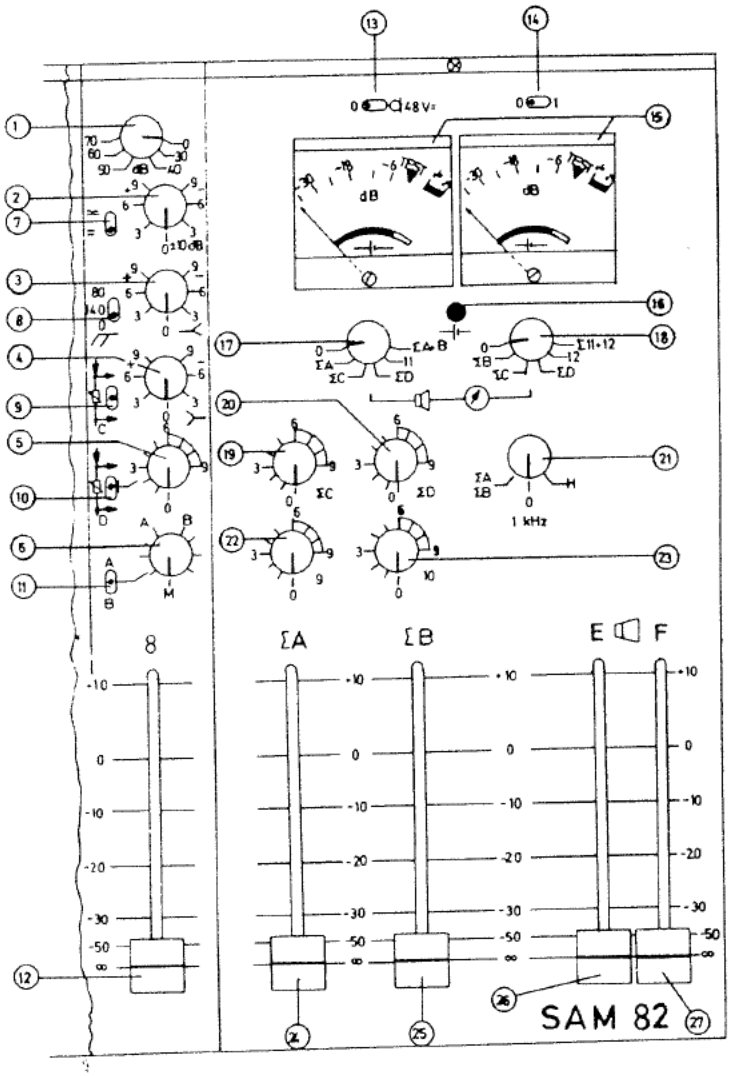
= Treble equalizer

= Base equalizer

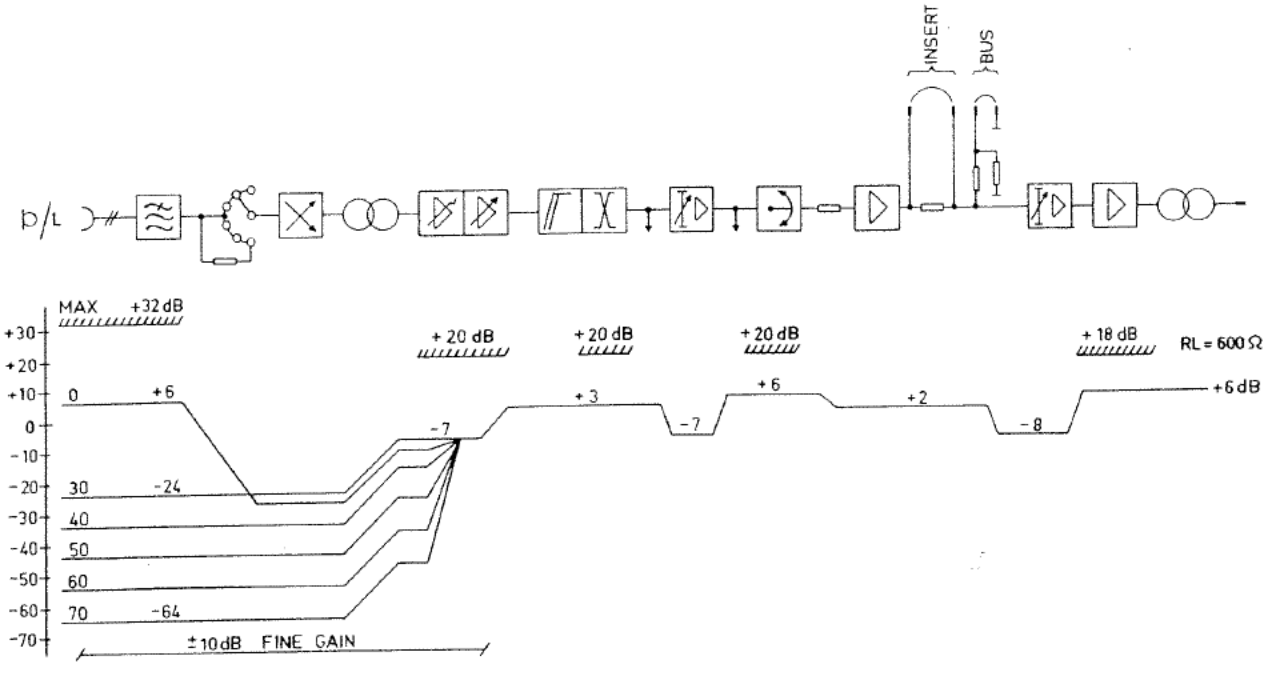
Pre fader
= Off
Post fader

Σ = Sum

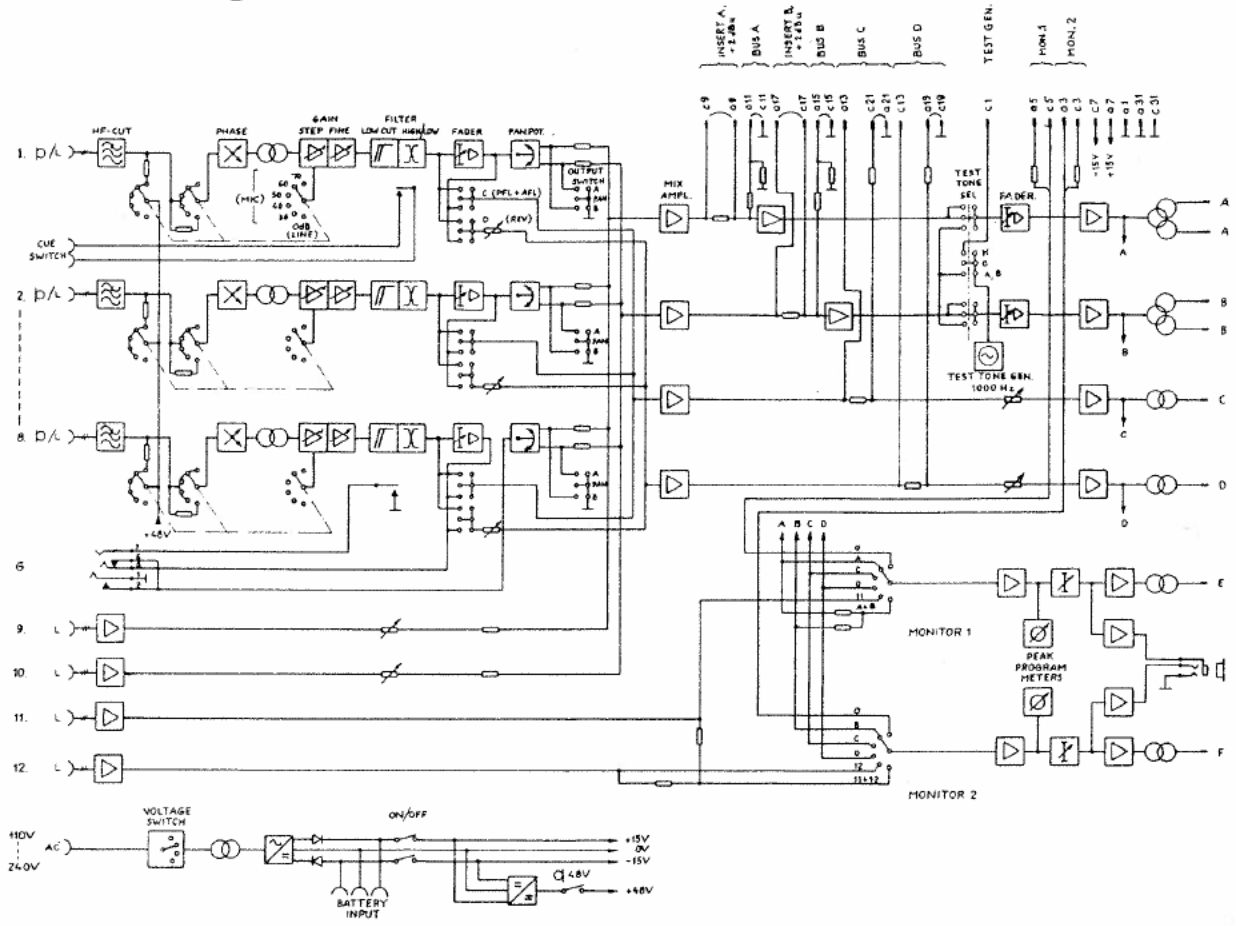
= Monitoring



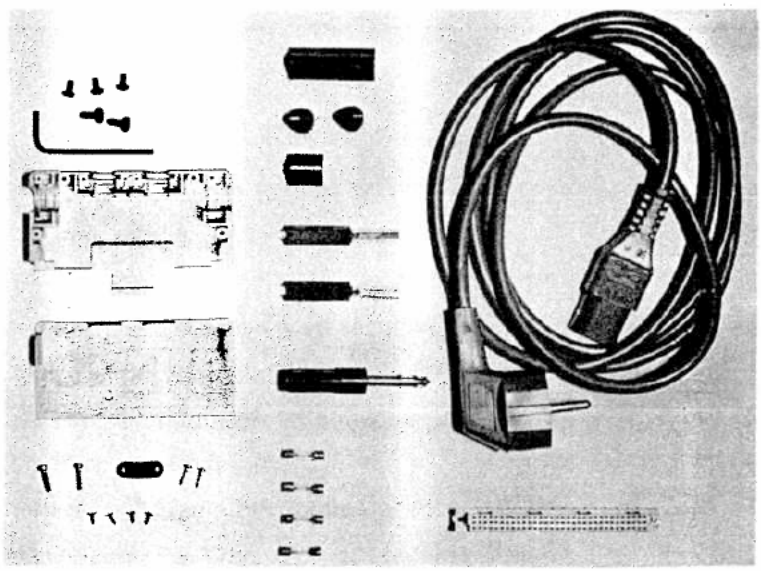
Level Diagram



Block Diagram



Supplied Accessories and Spare Parts



- 1 Stereo grip 59967
- 1 Power cable
- 1 Multi pin connector
- 1 Housing
- 1 Telephone plug
- 2 Single pole connector
- 2 Fuse 200 mAT 5x20
- 2 Fuse 400 mAT 5x20
- 2 Knob 61172
- 1 Knob 61173
- 2 Screw F6S4 4x10
- 3 Screw RX poz 3x6
- 1 Hexagon wrench (insex) 2,5 mm

Accessories

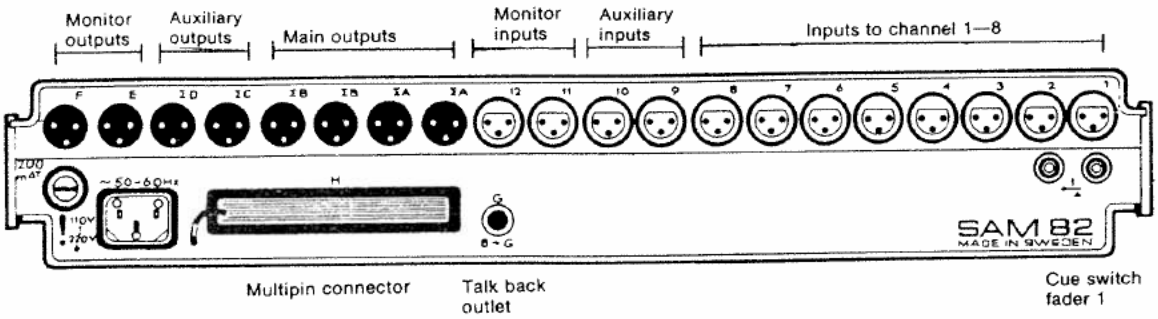
Battery Unit BU 4020
for 20 (or 40) 1.5 standard "D" cells IEC R20.
Power capacity for 10 (or 20) hour operation.

Carrying Case
Metal 490 x 380 x 170 mm (W x D x H)

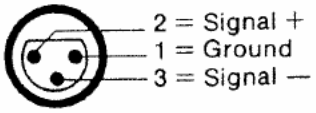
Connection Cable CC 282 A
to connect two mixers to each other.

Pre-Fader Listening (PFL) Unit
Instructions for installation are delivered with the unit.

BACK PANEL VIEW

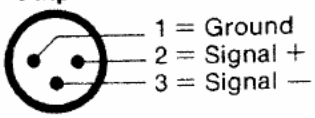


Inputs



All inputs are symmetrical. Inputs 1—8 are floating.
Line input impedance 10 kohms.
Nominal line level 1.55 volts (+ 6 dB).
Microphone input impedance > 1 kohm.
Recommended microphone impedance 200 ohms.

Outputs

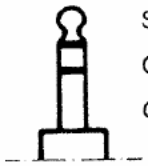


All outputs are separately floating.
Output impedance < 60 ohms.
Minimum load impedance 600 ohms.
Nominal output level 1.55 volts (+ 6 dB).

Cue switch

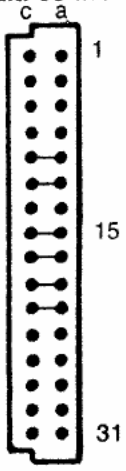
This switch will close when fader 1 is opened.
Equipped with 4 mm single pole connectors.

Talk back



Plugging a 1/4 inch telephone plug into this outlet will disconnect channel 8 from the rest of the console and bring out the signal. Nominal output level is 1.55 volts and minimum load impedance is 1 kohm. Additionally a cue switch will close to ground when fader 8 is opened.

Multi connector



1a	Ground	1c	Oscillator out
3a	Monitor in — right	3c	Monitor in + right
5a	Monitor in + left	5c	Monitor in — left
9a	Input fader A	9c	Output mixpoint A
11a	Input/gain fader A	11c	Ground
13a	Output mixpoint C	13c	Output mixpoint D
15a	Input gain/fader B	15c	Ground
17a	Output mixpoint B	17c	Input fader B
19a	Input fader D	19c	Ground
21a	Ground	21c	Input fader C
23a	NC	23c	NC
25a	NC	25c	NC
27a	NC	27c	NC
29a	NC	29c	NC
31a	Ground	31c	Ground

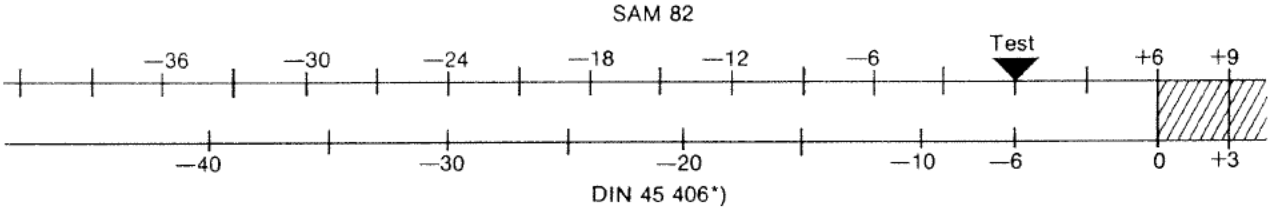
Technical Data

Amplification:	+80. . .-10 dB	
Frequency response:	40 - 15,000 Hz +0.5/-1.0 dB Typical: 40 - 15,000 Hz ±0.5 dB 10 - 50,000 Hz ±3 dB	
Distortion:	THD ⩽ 0.2 % 40 - 15,000 Hz Typical: 0.015 % at 1 kHz	
Nominal output level:	Zero indication 0 dB output (0.775V)	
Max. output level:	⩾ +20 dB rel. into 10 kOhm load ⩾ +18 dB rel. into 600 Ohm load	
Load impedance:	⩾ 600 Ohm, Headphone outlet 2 x 200 Ohm	
Output impedance:	< 80 Ohm	40 - 15,000 Hz
Input impedance:	Microphone Line	> 1 kOhm 40 - 15,000 Hz 10 kOhm
Equivalent input noise level:	Microphone E wtd A-curve Typical Line Echo send, cue	Rs = 200 Ohm <-128 dB -130 dB <-85 dB <-84 dB
Phantom Supply:	48 V according to Nordic N3. (DIN 45595) Max. current 10 mA	
Supply voltage:	ac 110, 127, 220, 240 V or dc ±15 V	
Current consumption:	ac <20 VA dc_{tot} <250 mA (+15 @ 140 mA; -15 @ 140 mA)	
Dimensions:	445 x 335 x 80 mm (W x D x H) (17.5 x 13.2 x 3.2)"	
Weight:	8 kg (17.6 lbs)	

PPM INSTRUMENT SAM 82

The instruments in the SAM 82 meet with the standards of the Nordic broadcasting companies. These standards are equal to DIN 45406 with the exception of the division of the scale.

In addition to the above mentioned DIN 45406 there are a number of different standards for sound level meters. Therefore, we have made the following summary to make clear what applies to SAM 82.



	SAM 82	DIN 45 406
Reference indication (reference voltage = 1.55 V = +6 dBm)	+6 dB	0 dB*)
Division of the scale	See figure above	
Frequency response	31.5—16000Hz+1 dB*	40—15000Hz+1.5 dB
Dynamic response (5000 Hz tone burst)		
Burst duration ms	Indication	
10	+5 dB±0.5 dB	—1 dB±0.5 dB*)
5	+4 dB± 1 dB	(—2 dB± 1 dB)*)
3	+2 dB± 1 dB	—4 dB± 1 dB*)
0.4*)	—9 dB± 2 dB	(—15 dB± 4 dB)
Integration time	5 ms*)	5 ms
Delay time	<300 ms	
Overswing	<1 dB*)	<1.5 dB
Return time (20 dB below reference indication)	1.7±0.3 s*)	1.5±0.2 s

*) According to IEC.

Interfacing SAM 82

SAM 82 is a high quality product designed for professional use. All inputs and outputs are symmetrical. Nominal line levels are +6 dB (1.55 Volts) and XLR connectors are used. To fully utilize the potential performance it is important to interface it appropriately. Therefore study these instructions and whenever in doubt consult your local dealer.

Microphones

The SAM 82 inputs 1—8 are designed for use with low Z dynamic and condenser microphones (50—600 ohms). Gain is set in 10 dB steps with a coarse gain selector and continous plus minus 10 dB with a fine gain control. Always adjust the gain to fully utilize the available dynamic range. A setting of 50—70 dB will be appropriate for a dynamic microphone and 30—50 dB for a condenser microphone.

A built in 48 volt phantom supply provides up to 10 mA of current for condenser microphones. This supply can be switched off which allows the inputs to float separately and thus enables the use of unsymmetrical signal sources. When the coarse gain is set to 0 it automatically disconnects the phantom supply.

Each input is equipped with a filter that eliminates high frequency energy and protects the console from radio frequency interference. This is especially important when working in the vicinity of transmitters.

Tape recorders

Professional type tape recorders will cause no problems and provided their input sensitivity is set to 1.55 volt the SAM 82 peak programme meters will monitor the recording levels accurately.

Non professional types might cause problems if they have low output levels and high output impedances. The SAM 82 line input sensitivity can be increased to 500 mV with the fine gain control. If this is not enough, a microphone gain of 20 dB can be set with the coarse gain in 30 and the fine gain in — 10. But watch out for the possible frequency response degradation due to complex loading (frequency dependent loading) of a high output impedance. Consult the tape recorder manual. If your tape recorder output impedance is more than 2 kohms never use a microphone gain setting.

Power amplifiers

The main concern when interfacing power amplifiers is levels. Usually the sensitivity is too high and a pad is required on the amplifier input. If this pad is not installed, the dynamic range cannot be utilized and the installation sounds 'noisy'. A good practice is to allow 6 dB of headroom above 1.55 volts which corresponds to a power amplifier sensitivity of 3 volts. This is only a recommendation and of course the sensitivity has to be adapted to actual listening levels and the power capability of the amplifier.

Another problem might be the introduction of hum due to ground loops. With the symmetrical floating output of the SAM 82 this can be solved by cutting the ground lead between amplifier and console. When the power amplifier is fed over a long cable, a fully symmetrical installation is recommended.

A special feature of the SAM 82 design is the complete absence of turn on and turn off transients.

Headphones

The SAM 82 headphone outlet is designed for use with 200—600 ohm units, though other impedances might work, including the popular 8 ohm headphones. The output impedance is 50 ohms.

Dismantling and assembling the console

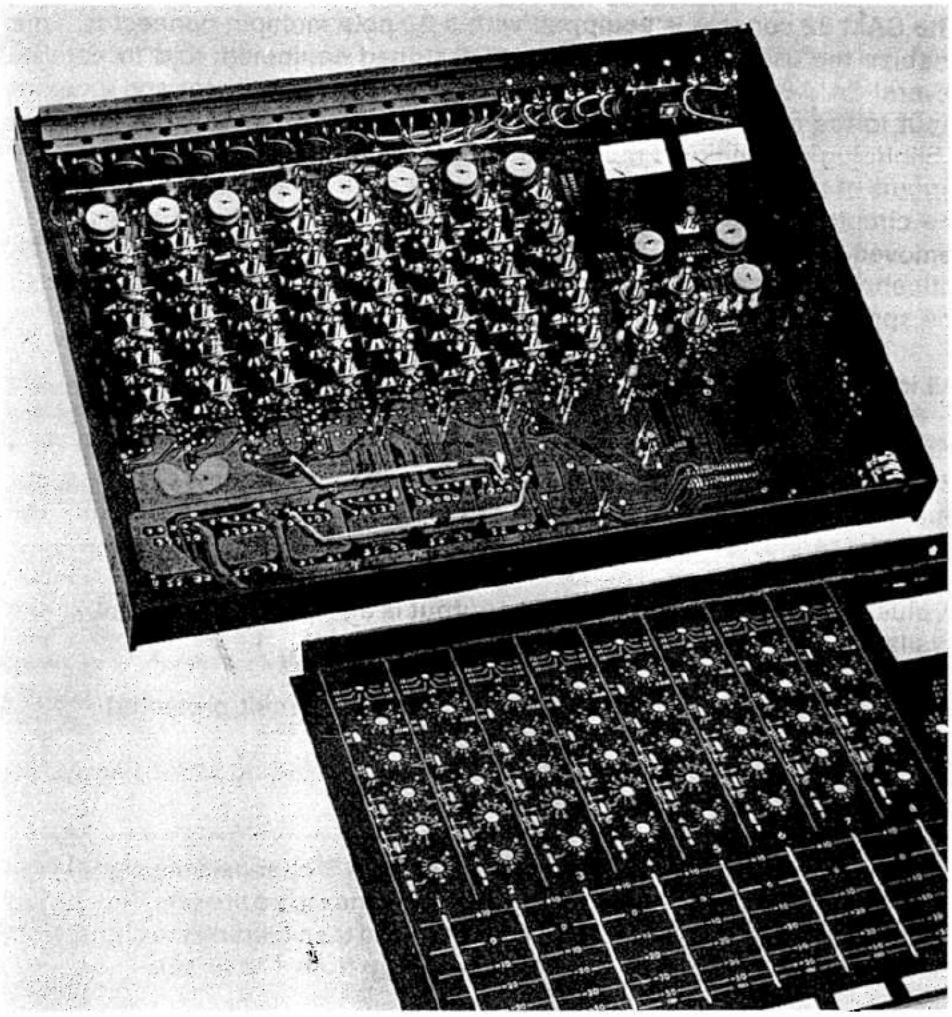
For service all the electronics can be accessible if the front and bottom plates are removed.

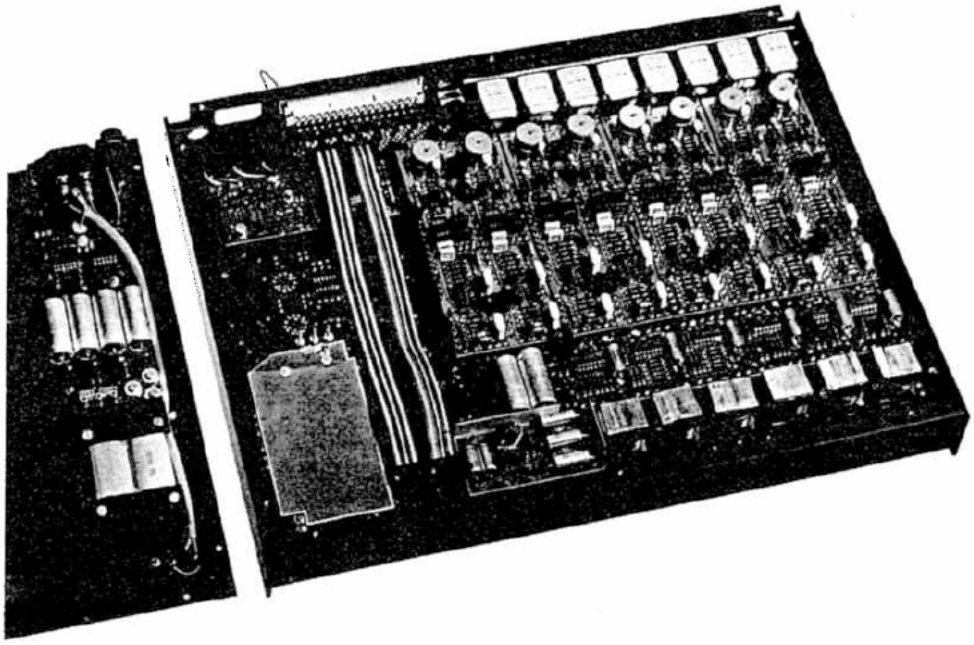
Dismantling

1. Remove the power cord.
2. Turn the console upside down and remove the bottom plate (ten screws around the edges).
3. Turn the console back and remove all knobs (pull them upwards).
4. Remove the three screws on top of the backpanel and slide the aluminum cover off.
5. Loosen the four screws on each side but don't unscrew them completely. Use the special hexagon wrench supplied with the console.
6. Pull both side plates outwards. Push the green LED through its mounting hole and remove the front plate.
7. Tighten the screws to secure the frame.

Assembling

1. Check that all selector shafts are correctly fitted.
2. Check the two springs in channels 2 and 7.
3. Loosen the four screws on each side but don't unscrew them completely.
4. Attach the front plate and secure it by tightening the screws.
5. Slide the aluminum cover on and secure it.
6. Place all knobs back on their shafts.
7. Turn the console upside down and fit the bottom. Be careful to adjust the position. Don't use force.





Using the multiconnector

The SAM 82 console is equipped with a 32 pole multipin connector. This enables the user to connect custom designed equipment and to parallel several SAM 82. It also provides an output from the oscillator and an extra input to the monitor chain. When not used, this connector is protected by a blindplug containing a number of jumpers. The jumper positions and the pinouts of the connector can be seen on the back panel view (page 5) and in the circuit diagram. The console will function even if the jumper-plug is removed, but crosstalk and also levels in the C and D channels will be influenced. When using the multipin connector facilities, be sure to install the appropriate jumpers in the new plug.

All input and output levels in the multipin connector are nominal line levels + 6 dB (100 percent on a PPM) except in the A and B channels where interstage levels are + 2 dB. The oscillator output level is 0 dB (test on a PPM). The maximum loading of any output is 2 kohms. Low output impedance sources are recommended when feeding signals into the multipin connector.

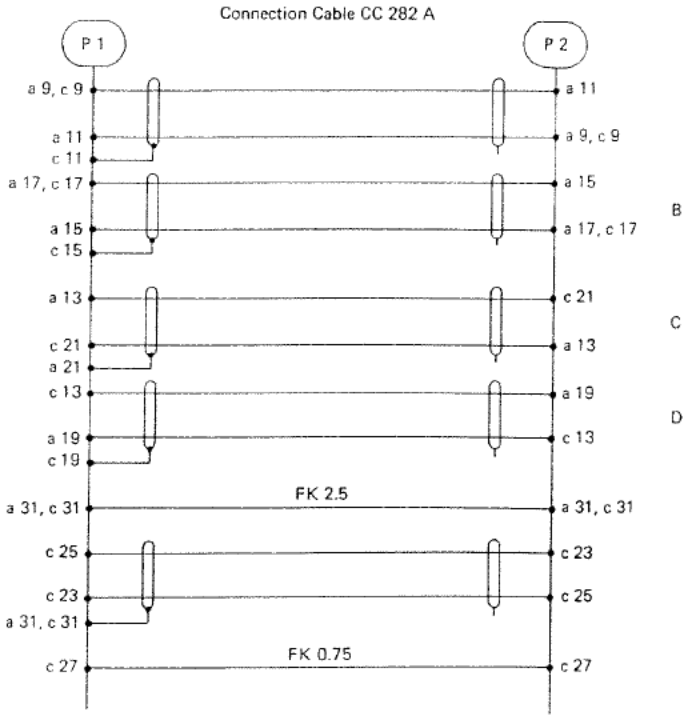
A plus minus 15 volts power supply output is also provided. The maximum available current for external equipment is 100 mA.

All terminals in the multipin connector are short circuit protected.

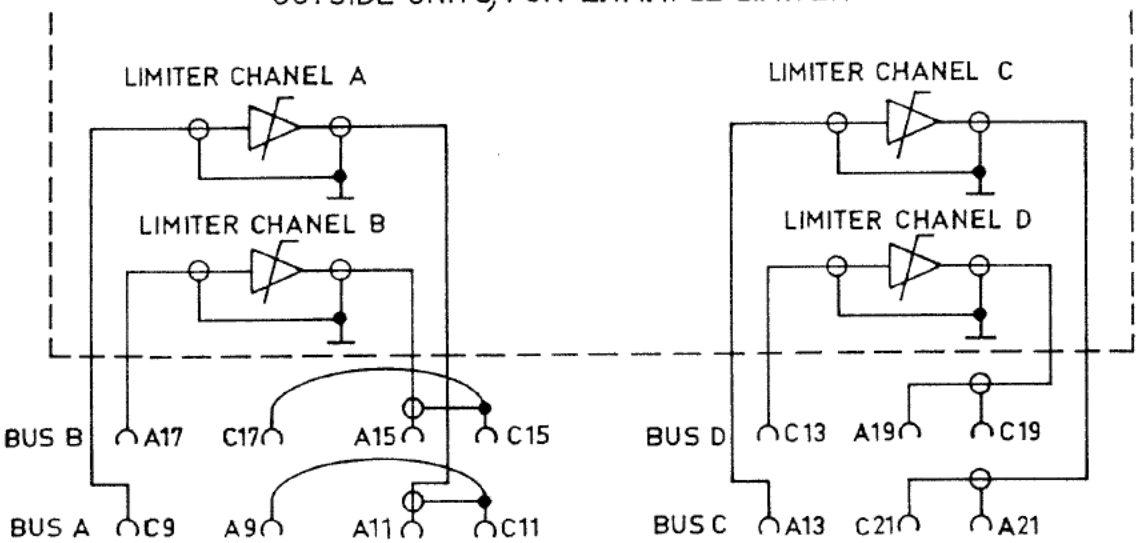
A special cable for interconnecting two SAM 82 according to the diagram on page 16 can be ordered as accessory CC282.

When installing a limiter or other units in A och B channels the signal path from the mixpoint amplifier output to the fader has to be broken. This can be accomplished by grounding pin 9a and 17c and then feeding the signal from 9c via external equipment to 11a respectively from 17a to 15a.

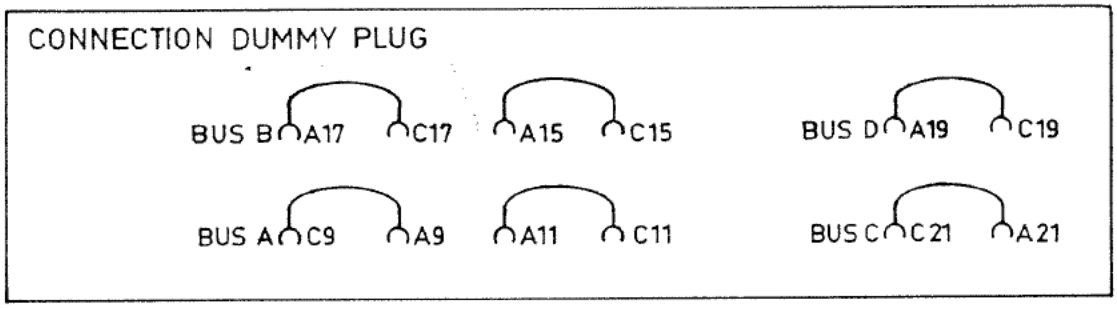
There are 8 spare terminals which can be used for special custom designs.



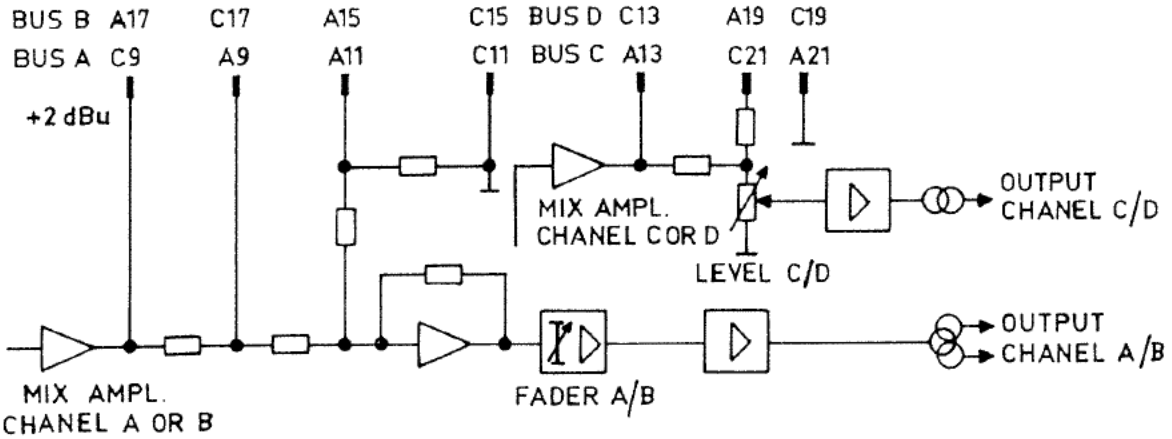
OUTSIDE UNITS, FOR EXAMPLE LIMITER

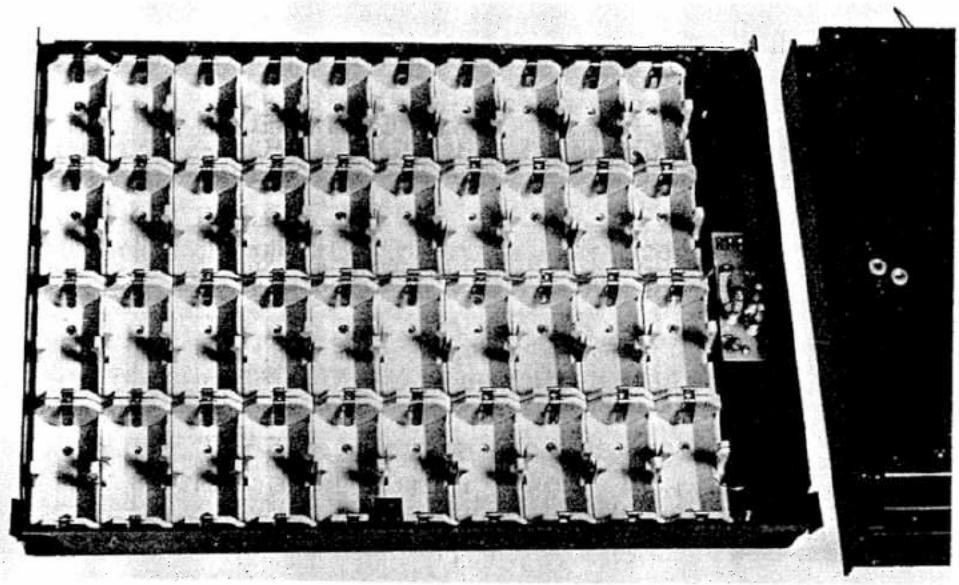


EXTERNAL CONNECTORS



MULTIPIN SAM 82





Battery unit

The SAM 82 can be fitted with a battery unit (BU4020). Carbon zinc batteries conforming to international standard (R20 type) are suitable. Their diameter should not exceed 33.5 mm and they should be between 59.5 and 62.5 mm long. 40 cells can be housed in the battery compartment but 20 cells are sufficient to feed the console.

Battery supply voltage

Carbon zinc batteries will supply plus minus 15 V. This voltage is fed through diodes and the console on/off switch direct to the power bus bars. The supply voltage can be monitored with the PPM meters when the battery test button is depressed.

Each scale division corresponds to one volt, thus + 9 dB = 15 V and TEST = 12 V. The left instrument shows the + 15 V supply and the right instrument shows the — 15 V supply. There is no specific voltage when the console ceases to function but operating in the red sectors of the battery test instruments is not recommended.

Battery polarity

A diode arrangement in the battery unit protects the electronics in case of wrongly inserted batteries. It also protects the two parallel branches of a 40 cell installation from discharging each other. No current can flow if batteries are not fitted with correct polarity.

Switching between battery and mains

As soon as the battery unit has been fitted under the console it is ready to run on batteries. If the mains is also connected, the console will be power supplied from the ac source, but as soon as this ac vanishes, the console will automatically switch over to batteries. If the ac turns up again it takes over from the batteries. A change over between mains and batteries might be indicated on the PPM meters but the signal will not be influenced in any way.

Notice that the battery voltage can only be monitored when the console is actually working on batteries.

Battery life

Battery capacity varies depending on how the batteries are used and how they have been stored. If periods of use are interspered with rest periods, during which the cells can depolarize, the capacity increases considerably. Normally the batteries can be used at temperatures from 0 to plus 50 deg. centigrade, and certain special types can be used at lower temperature. If batteries are stored at or below + 20 deg. centigrade their shelf life will be more than 12 months with a remaining energy of 75 to 90 percent. This is reduced to 3 months if the storage temperature is raised to + 40 deg. centigrade. Cold storage produces excellent results and cells retain their full capacity if deep frozen.

The standby current consumption (140 mA) of the SAM 82 represents a rather small loading on the batteries and the expected life is roughly 10 hours with 20 batteries and 20 hours with 40 batteries.

Supply considerations

The performance of a battery cell depends largely on the conditions and length of storage before use. Care should therefore be taken when suppliers are selected.

When a cell is discharged it may leak a corrosive liquid which can cause damage to the battery unit. The batteries should therefore be checked frequently. If the battery unit shall not be used for several months, the batteries should be removed.

Leak proof batteries are available which eliminates the risk of leakage.

Alkaline batteries and accumulators

Although the battery unit originally was designed for carbon zinc cells it can of course be fitted with accumulators and other types of batteries. The alkaline type offers a great increase in battery life. Actually a battery unit filled with alkaline batteries will supply power to a SAM 82 for more than 100 hours. Alkaline batteries also offer increased performance at low temperatures. The weight of alkaline batteries is about 1.5 times the weight of carbon zinc cells.

If they are not completely discharged certain brands of alkaline batteries can be recharged but be careful because some manufacturers forbid it. Consult your battery supplier for further information.

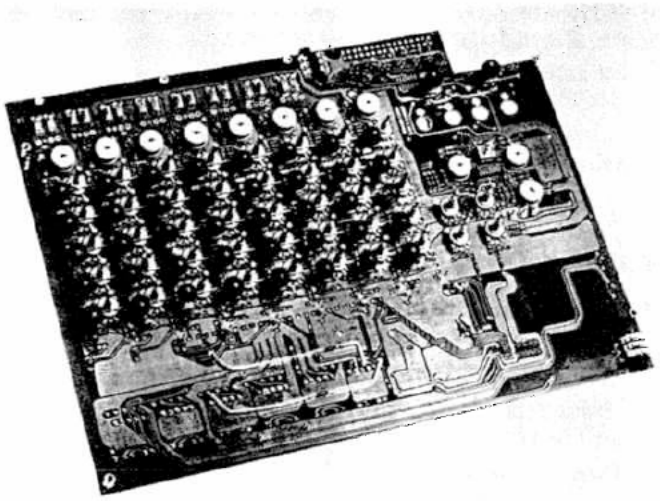
Mother board electronics

Some of the electronics for the monitoring function of the SAM 82 have been mounted direct on the mother board. The quad amplifier used is fitted in a socket in order to facilitate replacements without damaging the printed circuit. Two sections of the amplifier are used to balance the auxiliary inputs J11 and J12. Resistors R5—R12 are one percent accurate in order to get 40 dB common mode rejection. Capacitors C5—C12 block dc from entering through the inputs. The other two sections of the quad amplifier are used to buffer the inputs of the peak programme meters and to compensate for the voltage drop when two inputs are mixed to one monitor output.

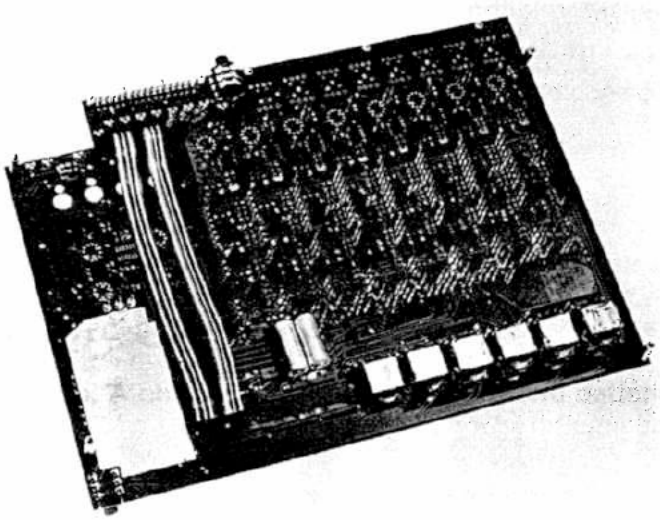
When the monitoring selectors S1 and S2 are in the zero position direct inputs to the monitoring buffer amplifiers are available through the multipin connector. The circuitry used gives symmetrical inputs. These inputs can be used to expand the monitor selector with external circuitry.

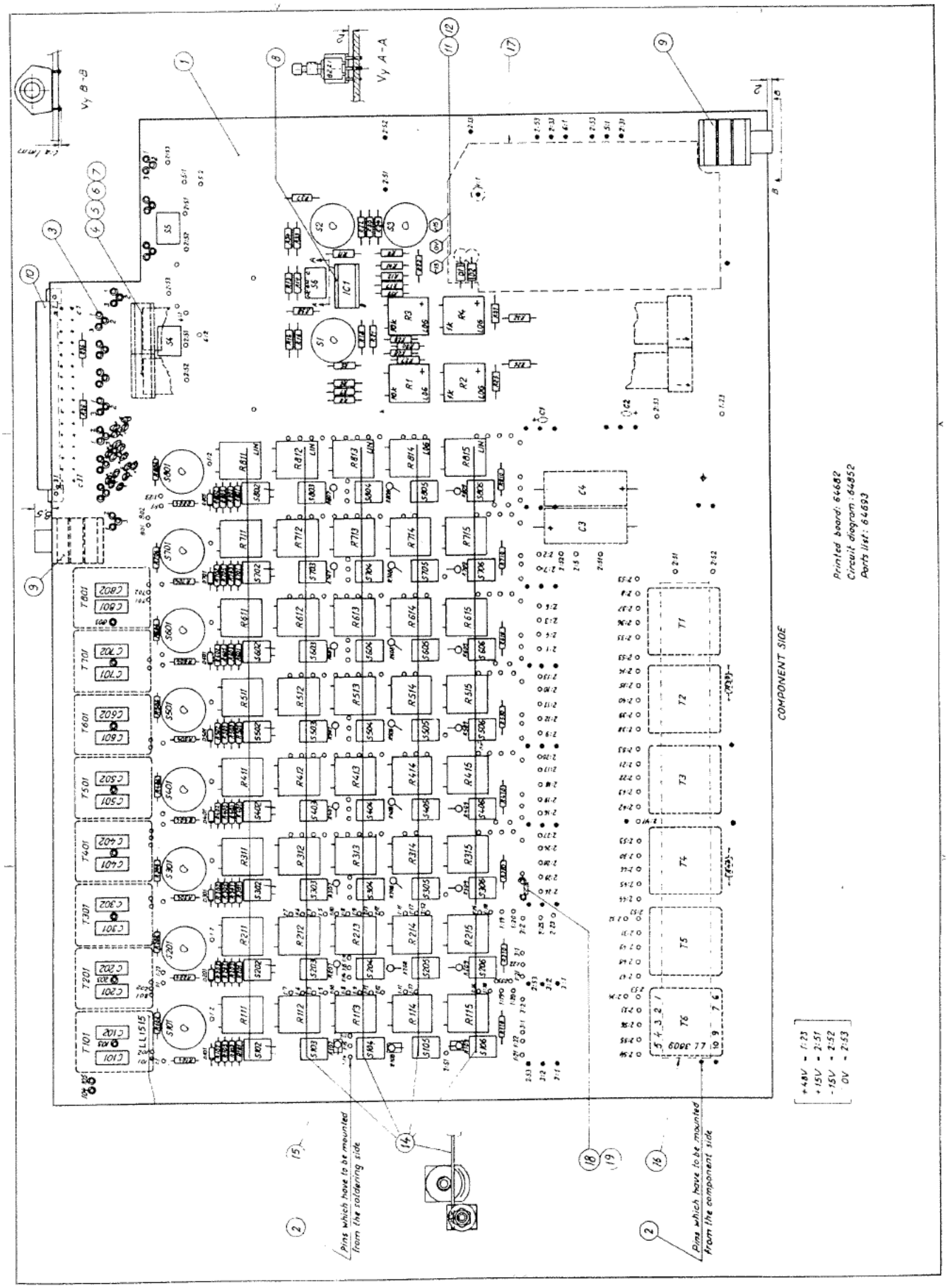
The two resistors R39 and R40 are installed to balance R15 and R16 and decrease crosstalk.

Top view



Bottom view




Printed board: 64682
Circuit diagram: 64852
Parts list: 64693
COMPONENT SIDE
Pins which have to be mounted from the soldering side
Pins which have to be mounted from the component side
+48V - 1:23
+15V - 2:51
-15V - 2:52
0V - 2:53

Integrated circuits

The SAM 82 has been constructed to take advantage of modern integrated circuits. In order to guarantee a high quality product all amplifiers installed are tested. When an amplifier is replaced the new IC **must** satisfy the following demands on performance. Tested amplifiers are available from the factory as spare parts.

709C

This amplifier is used in the input stage only.

Noise must be less than — 113 dBA RMS referred to input with a source impedance of 10 kohms at 20 degrees centigrade. (0 dB = 0.775 volts)

With a transformer gain of 17 dB this corresponds to a microphone input noise of — 130 dBA RMS with a source impedance of 200 ohms. The complete console is guaranteed to have a noise of less than — 128 dBA.

HA—4741

This is a quad amplifier used in all circuits except the input stage.

Slew rate must be more than 1.4 volts/μsek in unity gain with 2 kohms loading.

Noise must be less than — 115 dBA RMS (0 dB = 0.775 volts) referred to amplifier input with a source impedance of 100 ohms.

Cross over distortion must not be visible on an oscilloscope with a 100 kHz sine wave input and the amplifier loaded with 2 kohms.

Input offset for amplifiers used in the peak programme meters must be less than 2 mV. (But noise performance is not critical for these units.)

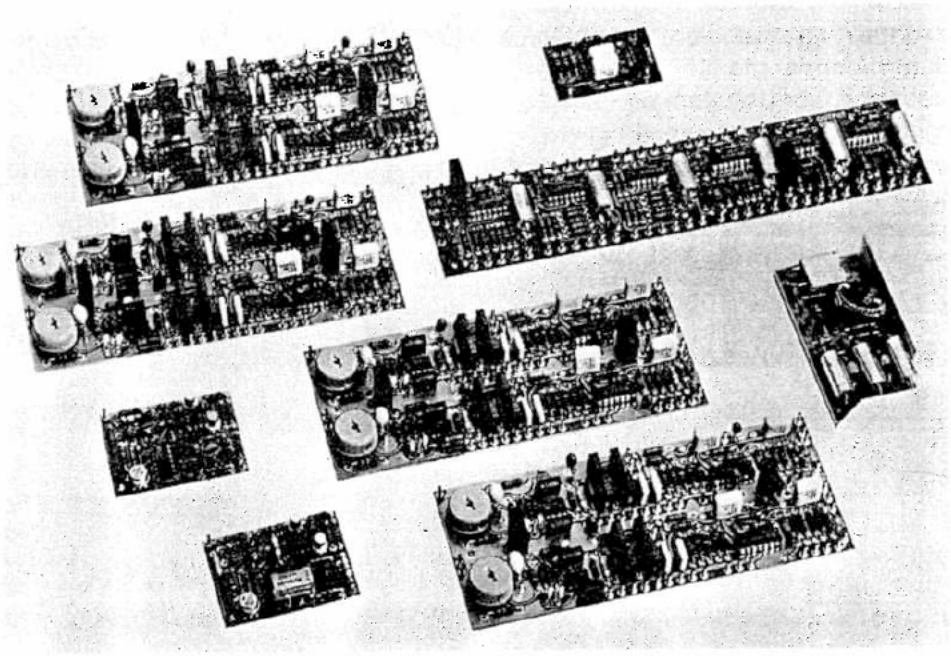
RC4558

This dual amplifier is used in the oscillator circuit. There are no special tests necessary for this IC.

723C

This IC is used in the power supply. There are no special tests necessary for this IC.

Plug-in units



The main circuit board contains most of the internal wiring and also supports all switches, potentiometers and selectors. Onto this board different subunits are mounted. This modular construction facilitates service as complete units can be interchanged. The factory can supply complete subunits as spare parts.

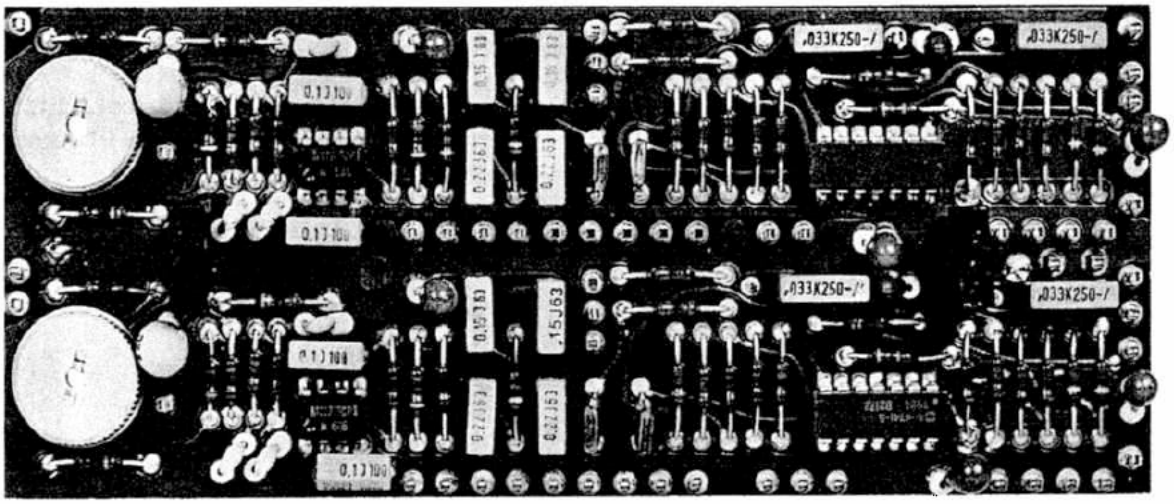
Components

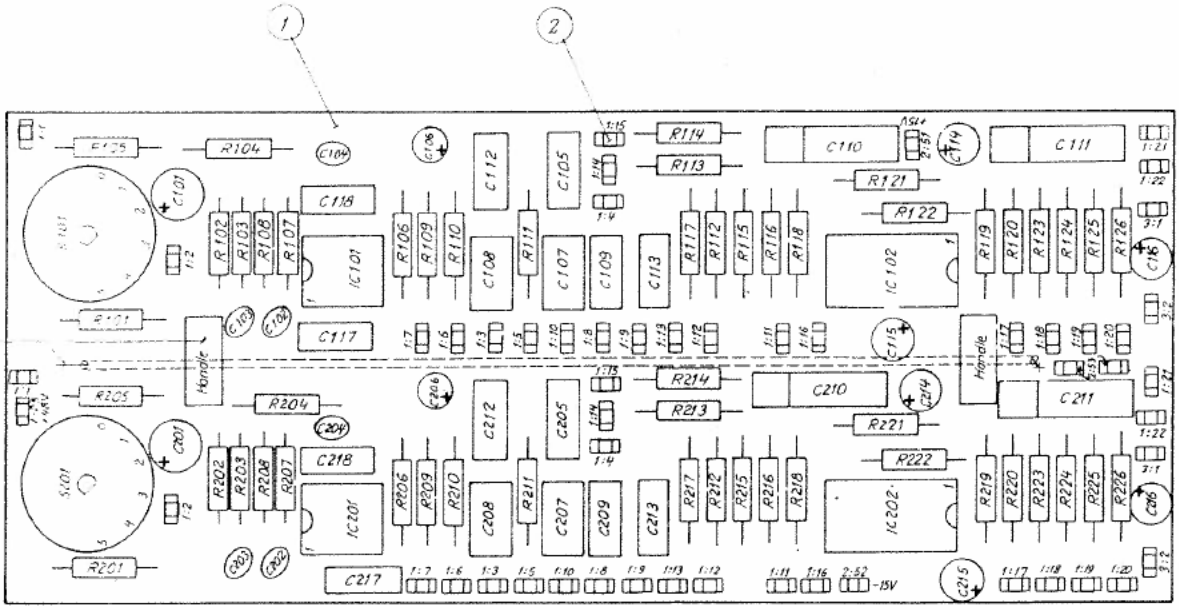
All components used are carefully selected. It is important to use components of equal quality as spare parts. The easiest way to get the right component is to order it from the factory or the local dealer.

Unsoldering

When unsoldering components be careful not to damage the printed circuit. The plated holes add difficulty and therefore use a solder wick or solder sucking tool. When the right tools are not at hand it is advisable to destruct the component and unsolder it part by part.

Input unit





OBS! The pins on the components must be cut. These must not stick out more than 1 mm on the soldering side

Input unit

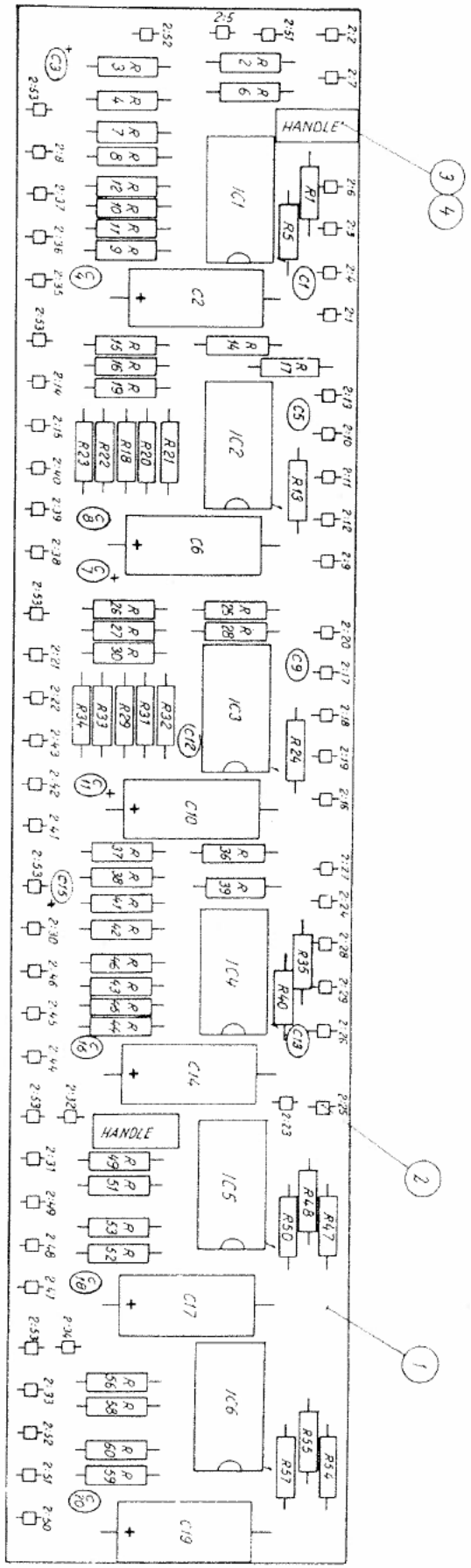
Each input has a low pass filter which is especially efficient in the 500 kHz to 30 MHz range and eliminates interference from radio transmitters, sparks and other high frequency sources. R102, 103, 104 and 105 form a 34 dB pad which is switched into circuit in the zero position of the coarse gain control. S102 is the phase reversal switch. C101 and C102 are capacitors in previously described filter. R104 and R105 shall be matched to 0.5 percent and C101 and C102 to within 1 percent. This is necessary to obtain a high common mode rejection (75 dB at 15 kHz). The input transformer steps up 17 dB and adjusts the recommended 200 ohm microphone impedance to the optimal amplifier feed impedance 10 kohms. IC1 is a 709 operational amplifier which has been tested for a noise less than — 113 dBA rel. 0.775 volt with a source impedance of 10 kohms. This corresponds to a noise figure of 2.5 dB. The total noise of the input stage is guaranteed to be less than — 128 dBA which equals a noise figure of 4.5 dB (typical — 130 dBA). R106 forces the output stage to operate in class A and eliminates crossover distortion. C104, C103, and R108 form the compensating network and have been optimized to eliminate transient distortion. This non standard compensation might cause oscillation in the MHz region if the 709 output is capacitively loaded.

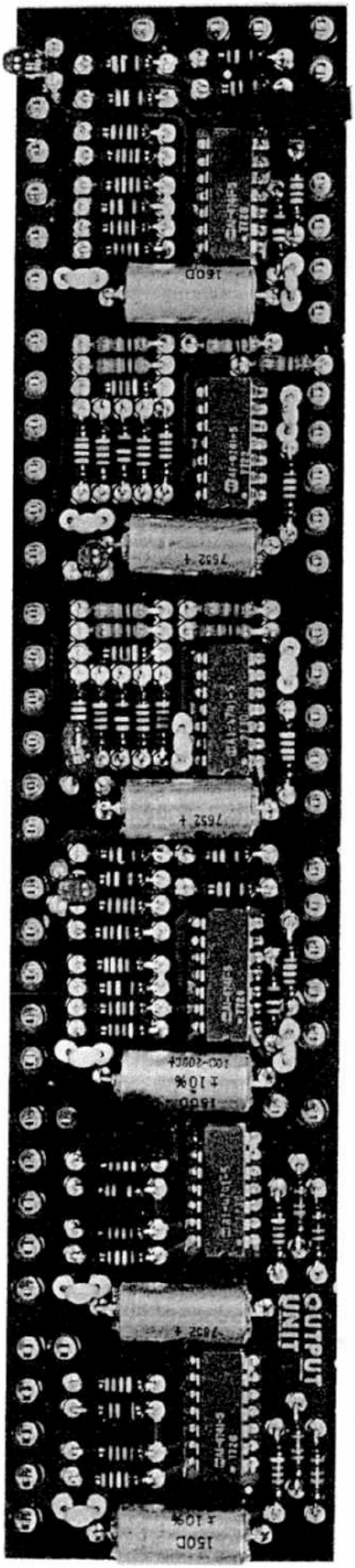
Note

Always insulate your measuring equipment with a couple of hundreds of ohms when testing at pin 6 of IC101.

The gain of the input amplifier can be varied from 0 to 40 dB by switching in resistor R101—R105 in the feed back path. The second stage gain can be varied with potentiometer R11 between 0 and 20 dB. In mid position it is 10 dB. The third stage is a low pass filter in unity gain configuration with a three position switch: off, 140 Hz, and 80 Hz. The cut slope is 12 dB per octave. The fourth stage is a baxandall type base treble equalizer with plus minus 10 dB at 100 Hz and 10 kHz. The asymptotic 'shelf' is plus or minus 15 dB. Signal drops 10 dB in the conductive plastic fader and this is compensated for in the fifth amplifier which has a gain of 13 dB. The output of this amplifier is to the pan pot and the output selector S106. Please observe that the pan pot is still in circuit even if the output selector S106 is operated. S104 and S105 are three position switches which enable the signal to be routed to auxiliary outputs C and D. R104 is an individual volume control for each input fed to output D.

Output unit





Output unit

All output stages are concentrated on a common circuit board. This unit also contains mixing amplifiers, auxiliary input amplifiers and headphone amplifiers. Quad amplifiers HA-4741 are used. IC1 and IC4 are amplifiers in the two identical main channels A and B and IC2 and IC3 are amplifiers for auxiliary output C and D. One section in each C and D channels is used as a symmetrical input amplifier for auxiliary input 9 and 10. Resistors R14—R17 and R25—R28 are 1 percent tolerances in order to achieve 40 dB common mode rejection. C17—C19 and C13—C15 block any DC from entering through J9 and J10. The auxiliary input signal available at pin eight of IC2 and IC3 is injected into channels A and B through R26, R25, R32, R31 and potentiometer R2 and R4 on the mother board.

One section in each quad is used as a mixpoint amplifier. In A and B channels the mixpoint output is at pin 1 and in C and D channels at pin 7. In channels A and B an extra amplifier is incorporated that compensates for signal drops when two consoles are interconnected. It also permits external equipment to be installed in the signal path. The total gain between pin 1 and 7 of IC1 is not affected when the jumper plug in the multipin connector is removed.

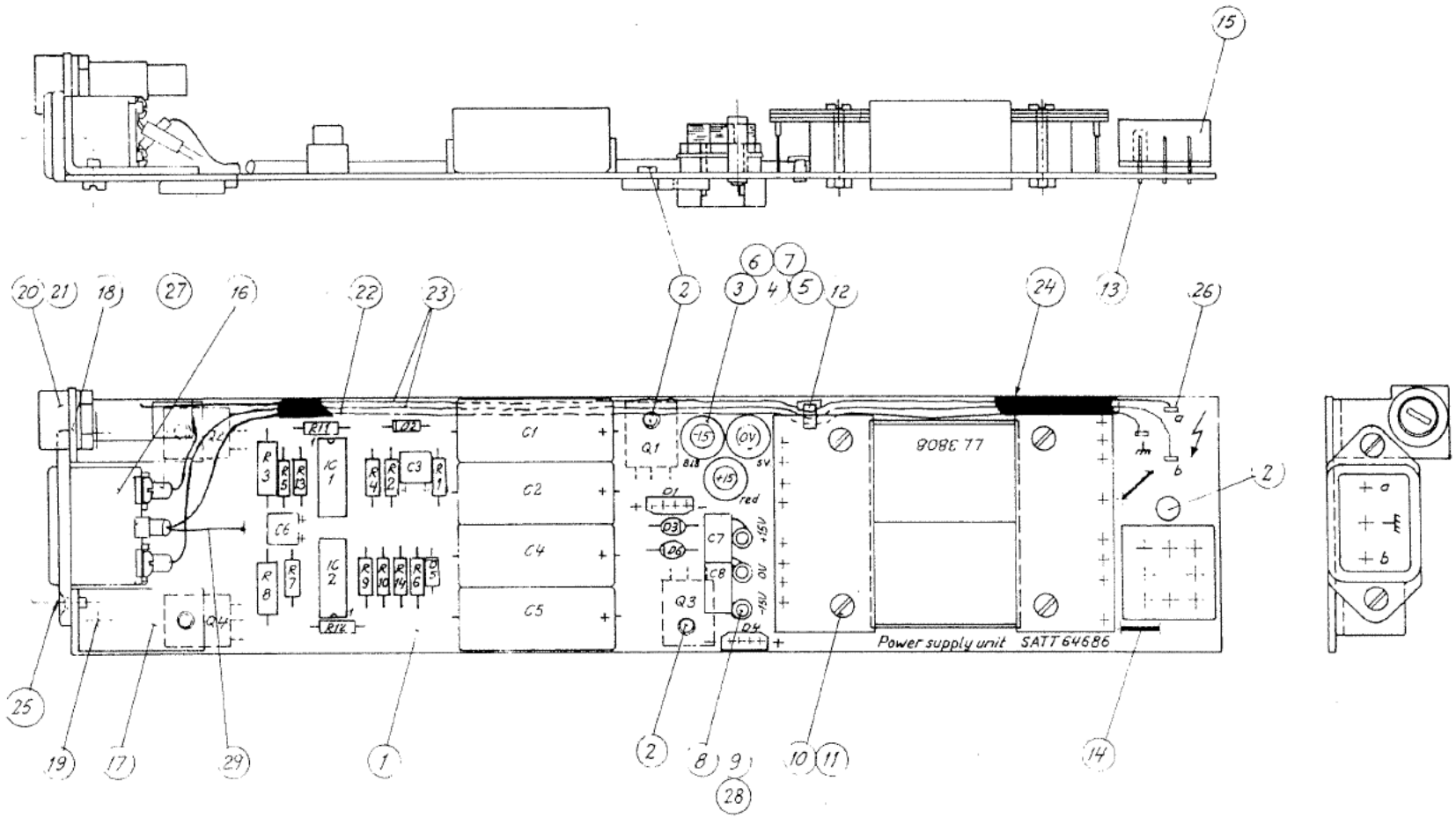
The output of each mixpoint is brought to the multipin connector as well as to the faders. The multipin connector also provides inputs to each output section.

From the four faders R1, R3, R9, and R10 (on the fader and mother board) the signal is brought to the actual output stage which has a similar configuration in all channels. It consists of two amplifiers working in push pull. Gain is set by R7 and R8. C2 insulates transformer T1 from DC offset and resistor R9 damps any resonance between T1 and C2. The second amplifier is used in an inverting configuration. The unity gain of this amplifier is set by R10, R11, R12, and the voltage of the feedback winding on T1. A feedback technique like this reduces both distortion and output impedance.

The two secondary windings of each output transformer are tied together in the C and D channels but are brought out separately in channels A and B.

Two IC5 and two IC6 are used as output stages in the two monitoring channels E and F. The gain of these amplifiers is determined by the network R49, R51, R52, R53.

The other two IC5 and IC6 in channel E resp. F work as voltage followers to drive the phone outlet. These two amplifiers are parallelled with 100 ohms resistors. The actual output impedance is therefore 50 ohms and the current output capability is twice that of a single amplifier.


Power supply unit SATT 64686
Printed board: 64686
Circuit diagram: 64853

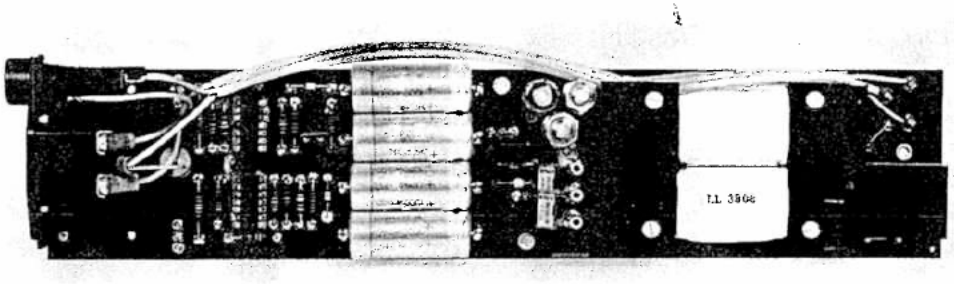
Power supply

Power for the SAM 82 can be supplied either from the mains ac or from an attachable battery unit. Switchover between battery and mains is automatic due to a diode arrangement.

The power supply is mounted on the bottom plate which acts as a heat sink. Please note that the power supply is operating whenever the console is plugged to the mains. Be careful to check the correct voltage setting before connecting the console to the mains. There are four possible voltage settings: 110 V, 127 V, 220 V, and 240 V. The voltage selector can be seen through a plastic window on the front edge of the bottom plate.

Transistors Q1, Q3 and zener diodes D2, D5 act as an overvoltage protection which will ensure that the input voltage to the IC regulators never exceeds 40 volts. This is possible thanks to the high output impedance of the power transformer. Regulators are conventional 723 designs with modifications in the current limiting circuits.

Output voltage with a load of 200 mA shall be 15.0—15.8 V. The correct loading is important because of the voltage drops in diodes D3 and D6. Adjustments can be made by altering resistors R13 and R14. The power supply is short circuit proof and current limiting occurs at approximately 330 mA. The supply is capable of delivering 250 mA continously at elevated temperature and with a 10 percent reduced mains voltage. Current drain of the console is approximately 140 mA. Noise and ripple is below 5 mV peak to peak. The unloaded output must not exceed 16.5 volts.



Peak programme meter

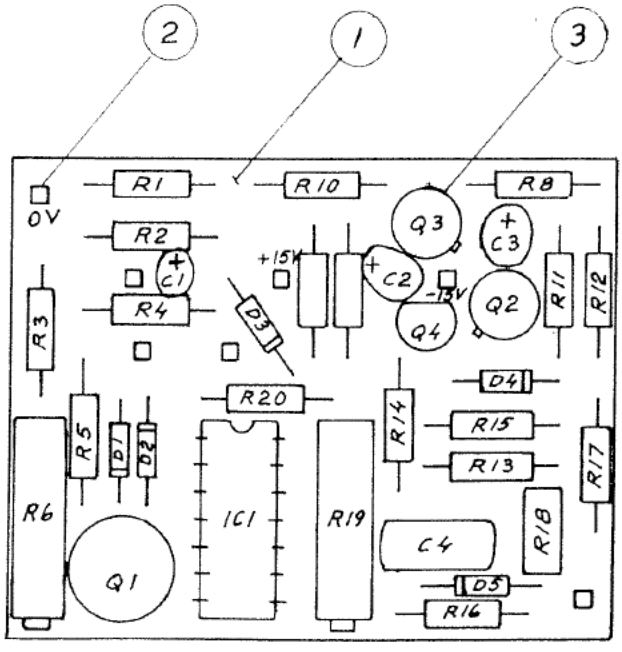
The SAM 82 is equipped with two peak programme meters with logaritmic amplifiers. Scale divisions, integration and release times conform to the N10 standards. Integration and release times also conform to the DIN standard for PPM.

There are two different types of instruments mounted in the SAM 82 production line. These two types of instruments have different ballistic characteristics and therefore need different optimal feed impedance to give correct damping.

The peak programme meter amplifier is built with the quad amplifier HA-4741. The first section forms a full wave rectifier together with R1, R2, R3, R3, D1, and D2. The dual transistor Q1 is the actual logaritmic converter. The current through R5 sets the zero point and is adjusted with R6 and stabilized by D3. The second section of IC1 acts as a comparator with two different feed back paths; either through Q2, IC1 (third section), R14, and Q1 or through D5. When the input signal is below the present peak reading the feed back path through D5 is used. Whenever the input signal exceeds this value the other feed back path is active. Capacitor C3, resistor R12, R11 and diode D4 determine the attack time. Diode D4 is used to compensate for nonlinearities in transistor Q1. The release time is set by resistor R13. When the current through Q2 exceeds a certain value set by R8, Q3 saturates and discharges C12. This causes Q4 to cut out R13 and delay the release time which enables the instrument pointer to reach its true peak. The length of the delay is determined by R10. The third section of IC1 acts as a voltage follower and insulates capacitor C3 from the feed back path through R14. The fourth section of IC1 amplifies the 'logaritmic' voltage developed across Q1. It also contains a temperature sensitive resistor R18 in the feed back path. This temperature compensation quarantees less than 1 dB change over the full temperature range. The full scale reading is set by R19. (For certain types of instruments the output impedance might be modified with an appropriate resistor from R19 to ground.)

ADJUSTING THE PPM AMPLIFIERS

1. Check the mechanical zero with the console switched off.
2. Connect an AC voltmeter and a 600 ohms load to one of the main outputs.
3. Turn the internal oscillator on and adjust the output level to —36 dB.
4. Adjust the PPM pointer to —36 dB with R6.
5. Increase the output level to 0 dB and adjust the PPM pointer to TEST with R19.
6. Reduce the level to —30 dB and readjust the pointer to —30 dB with R6.
7. Repeat steps 5 and 6 until no further adjustments are necessary.



Oscillator unit

The SAM 82 oscillator unit works as an LC oscillator with an active L made up of R1, R2, C1 and half of IC1. C2 is the capacitor in the 'LC' circuit. These four components determine the frequency of oscillation. Energy is fed into the LC circuit through resistor R5 and diodes D2 and D1. Output level is set by R5 and zener diode D3.

Frequency is 1 kHz plus minus 10 percent.

Output level is 0 dB plus minus 0.7 dB. (0 dB = 0.775 V)

THD is less than 1 percent.

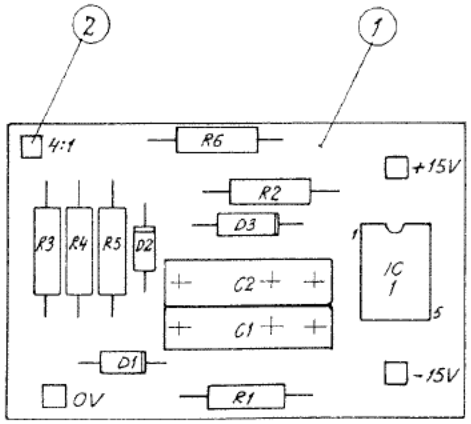
Specification is met over the voltage range plus minus 15 volts to plus minus 11 volts.

Phantom unit (Condenser microphone supply)

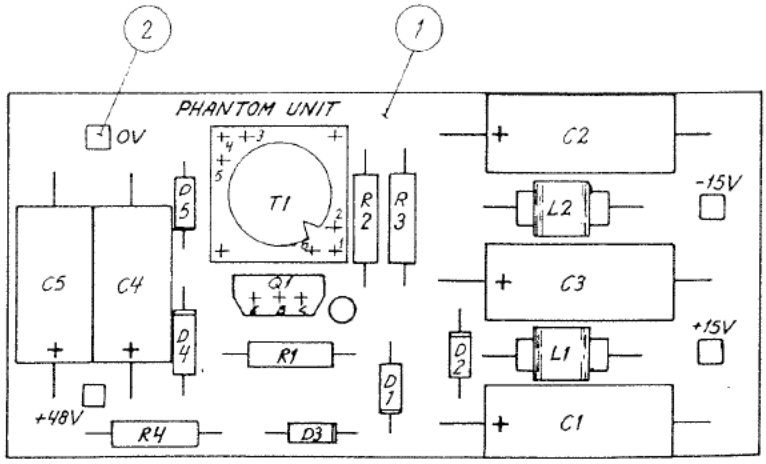
The SAM 82 console is supplied with a built in 48 volts dc to dc converter for condenser microphone feeding. This power supply is built on a separately shealded printed circuit board.

Diodes D2, D1 and resistors R2, R3 bias the transistor Q1 to ensure unconditional start up. Resistor R2 also limits base current during oscillation. Energy is built up in the transformer T1 during one half period and transferred to the load through D5 next half period. Diodes D4 and D3 reduce the base current of Q1 when the correct output voltage has been reached. This circuit stabilizes the output voltage and reduces its dependence on supply voltage. It also increases the efficiency. C1, C2, C3, L1 and L2 act as an input filter which prevents spikes from reaching the power rails.

C4, C5 and R4 smooth the output. The stand-by current drain is less than 3 mA and the maximum load current is 10 mA with a minimum output voltage of 44 volts. The unloaded output voltage is 50 volts. The output is short circuit proof.



Oscillator unit



Phantom unit

Det nr	Gruppvariant /4 /3 /2 1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	61200	
		Circuit diagram	64852	
		Test procedure	67842	
1	1	Panel	62847 lettering drawing 61193	
2	1	Frontsection	64201 ass	
3	1	Sidesection	62850 ass	
4	1	Sidesection	60643 ass	
5	1	Connection panel comp.	64861/1 ass	
6	1	Top Plate	62848	
7	1	Cover	64202	
8	1	Bottom with power supply	61190 ass	
9	8	Axis	61176/1	
10	3	Axis	61176/2	
11	11	Retaining Ring	RS 3,2 Din 6799	
12	4	Input unit	64694 ass	
13	1	Output unit	64695 ass	
14	2	P.P.M amp unit	64700 ass	
15	1	Osc. unit	64698 ass	
16	1	Phantom unit	64851 ass	
17	1	Fader unit	64696 ass	
18	2	Spring	64959	
19	42	Gasket (packning)	61181	
20	55	Knob	61172	
21	12	Grip	61173	

Det nr	Gruppvariant /4 /3 /2 1 Antal per gruppvariant	Benämning	Beteckning	Anm
22	1	Shielding box	59962	
23	2	Insulating plate	59963	
24	8	Insulating plate	59969	
25	1	Insulating plate	59968	
26	3	Screw	FX poz 3x6 st	svartförn.
27	10	Screw	RX poz 3x6 st	svartförn.
28	8	Screw	F6S4 4x10 st	svartförn.
29				
30	10	Lockwasher	IT 3,2 st	svartbetad
31		Cap	P/N 7062-1	
32				
33		By packed		
34	1	Stereo-grip	59967	
35	1	Power cable	3 SA/2M	Multikomponent
36	1	Connector	00-8257-096-648-129	Elco
37	1	Cover	for series 8257	Elco
38	1	Telephone plug	P4 42-7350 Cliff	Elfa
39	1	Single pole connector	Type 553 black Futters	
40	1	Single pole connector	Type 553 blue Futters	
41	2	Fuse	200 mAT Ø5x20mm	
42	2	Fuse	400 mAT Ø5x20mm	
43	2	Knob	61172	
44	1	Grip	61173	
45	2	Screw	F6S4 4x10 st	svartförn.
46	3	Screw	RX poz 3x6 st	svartförn.
47	1	Insex tool	2,5 mm	
48				

Connection panel 64861

Det nr	Gruppvariant 4 / 3 / 2 / 1 — Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64861	
		Circuit diagram	64852	
		Test procedure		
1	1	Bar	61170 ass textdrawing 61195	
2	1	Master card	64693/1 ass	
3	1	Instrumentboard	64955 ass	
4	1	Led unit	64699 ass	
5	12	Connector	Type XLR-3 socket contacts	Cannon
6	8	Connector	Type QG 3M pin contacts	Switchcraft
7	2	Connector	Type 551 nr 40-6160-2	Elfa
8	1	Filter Unit	67801 ass	
9	1	Dummy contact	64954	
10				
11				
12				
13				
14				
15				
16				
17	7	Screw	LKCS 3x8 St	Fz 5-8 µm kro.bl.
18	2	Screw	LKCS 2x14 St	Fz 5-8 µm kro.bl.
19	2	Screw	LKCS 2x6 St	Fz 5-8 µm kro.bl.
20	2	Nut	M6M 2 St	Fz 5-8 µm kro.bl.
21				

Det nr	Gruppvariant 4 / 3 / 2 / 1 — Antal per gruppvariant	Benämning	Beteckning	Anm
22	3	Wire	FKUB 1x0,25 red 10 cm	Skalad 7 mm i vardera änden
23	3	Wire	FKUB 1x0,25 orange 10 cm	
24	3	Wire	FKUB 1x0,25 brown 10 cm	
25	10	Wire	FKUB 1x0,25 red 8 cm	
26	9	Wire	FKUB 1x0,25 orange 8 cm	
27	7	Wire	FKUB 1x0,25 brown 8 cm	
28	8	Wire	FKUB 1x0,25 red 28 mm	Skalad 3 mm i vardera änden
29	8	Wire	FKUB 1x0,25 orange 33 mm	
30	1	Wire	FKUB 1 x 0,25 Black 8 cm	Skalad 7 mm i vardera änden

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning		Anm
		Assembly	64693		
		Circuit diagram	64852		
		Cover paint drawing	64682		
		Test procedure			
1	1	Printed board	64682		
2	356	Wire wrapping pin	75401-008	Berg	
3	46	Solder terminals	1107-0208	Avdel	
4	1	14-pin interconnect	CA-D-14P-02-261-CT-91/2"	Nordqvist o Berg	
5	1	16-pin interconnect	CA-D-16P-02-261-CT-91/2"	Nordqvist o Berg	
6	1	Socket	CA-145-10SD	Nordqvist o Berg	
7	1	Socket	CA-165-10SD	Nordqvist o Berg	
8	1	Socket	CA-14LS2-10SD	Nordqvist o Berg	
9	2	Telephone jack	S3/MBB best.nr 42-76903	Elfa	
10	1	Connector	00-8257-096-000-129	Elco	
11	3	Contact	1.80.107-301.00	Dunker	
12	3	Nut	M6M3		
13	92	Tuberivet	PRN 1,5 x 0,25 x 4 - 5150 Fn		Götarp
14	5	Stainless steel wire	SIS 2331 Ø 1,25 längd=270 mm		
15	24	Resistor Holder	CO 5020-0400		Standard Radio AB
16	1	Insulating plate	64958		
17	1	Shielding plate	64957		
18	1	Copper wire	GLFT SM0010-02 Ø 0.75 L = ca. 12 mm		
19	1	Teflon tube	UTW AWG NAR20 Ø 0.8 L = ca. 5 mm		

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning			Anm
	16	C101 - C801 Capacitor	1500pF ± 1 %	PFE 216	Rifa	C101/C102 etc mäts ut par-
			(Alt. Min 1200 pF +1 % Max 1800 pF +1 %)			vis till +1 %.
	1	C1 Capacitor	22µF 16V	ETP-3	Roe	
	1	C2 Capacitor	22µF 16V	ETP-3	Roe	
	1	C3 Capacitor	1000µF 40V	EG 1000/40	Roe	
	1	C4 Capacitor	1000 µF 40V	EG 1000/40	Roe	
	1	C5 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C6 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C7 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C8 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C9 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C10 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C11 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C12 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C13 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C14 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C15 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C16 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C17 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C18 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C19 Capacitor	4,7µF 35V	ETP-2-E	Roe	
	1	C20 Capacitor	4,7µF 35V	ETP-2-E	Roe	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	8	D101 - D801 Diode	IN 4148	
	1	D1 Zenerdiode	IN 5355 Motorola	
	1	D2 Zenerdiode	IN 5355	
	1	IC1 Intergrated circuit HA1 - 4741 - 5 (Selected according to spec.)		
	8	R101 - R801 Resistor	1K ±2% SBC 0309 Beyschlag	
	8	R102 - R802 Resistor	100 ohm ±2% SBC 0309 Beyschlag	
	8	R103 - R803 Resistor	100 ohm ±2% SBC 0309 Beyschlag	
	8	R104 - R804 Resistor	4,7K ±2% } < 0,5% Matched SBC 0309 Beyschlag	
	8	R105 - R805 Resistor	4,7K ±2% } 0,5% Matched SBC 0309 Beyschlag	
	8	R106 - R806 Resistor	1M ohm ±2% SBC 0309 Beyschlag	
	8	R107 - R807 Resistor	4,7K ±2% SBC 0309 Beyschlag	
	8	R108 - R808 Resistor	9,1K ±2+ SBC 0309 Beyschlag	
	8	R109 - R809 Resistor	8,2K ±2% SBC 0309 Beyschlag	
	8	R110 - R810 Resistor	8,2K ±2% SBC 0309 Beyschlag	
	8	R111 - R811 Potentiometer	5K ±10% LIN 0502 606 GND enl.ritn. 61174 Ruwido	
	8	R112 - R812 Potentiometer	50K ±10% LIN ±4% 0502 606 GND enl ritn. 61174 Ruwido	
	8	R113 - R813 Potentiometer	50K ±10% LIN ±4% 0502 606 GND enl.ritn. 61174 Ruwido	
	8	R114 - R814 Potentiometer	5K ±10% LOG 0502 605 GND enl.ritn. 61188 Ruwido	
	8	R115 - R815 Potentiometer	5K ±10% LIN 0502 606 GND enl.ritn. 61174 Ruwido	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	R1 Potentiometer	10K ±10% LOG 0502 605 GND enl.ritn. 61188 Ruwido	
	1	R2 Potentiometer	1K ±10% LOG 0502 605 GND enl.ritn. 61188 Ruwido	
	1	R3 Potentiometer	10K ±10% LOG 0502 605 GND enl.ritn. 61188 Ruwido	
	1	R4 Potentiometer	1K ±10% LOG 0502 605 GND enl.ritnl 61188 Ruwido	
	1	R5 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R6 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R7 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R8 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R9 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R10 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R11 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R12 Resistor	10K ±1% SBC 0309 Beyschlag	
	1	R13 Resistor	9,1K ±2% SBC 0309 Beyschlag	
	1	R14 Resistor	9,1K ±2% SBC 0309 Beyschlag	
	1	R15 Resistor	9,1K ±2% SBC 0309 Beyschlag	
	1	R16 Resistor	9,1K ±2% SBC 0309 Beyschlag	
	1	R17 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R18 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R19 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R20 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R21 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R22 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R23 Resistor	6,2K ±2% SBC 0309 Beyschlag	

Def nr	Gruppvariant 4 3 2 1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	R24 Resistor	6,2 K ±2% SBC 0309 Beyschlag	
	1	R25 Resistor	1K ±2% SBC 0309 Beyschlag	
	1	R26 Resistor	2,4K ±2% SBC 0309 Beyschlag	
	1	R27 Resistor	2,7K ±2% SBC 0309 Beyschlag	
	1	R28 Resistor	2,7K ±2% SBC 0309 Beyschlag	
	1	R29 Resistor	2,7K ±2% SBC 0309 Beyschlag	
	1	R30 Resistor	2,7K ±2% SBC 0309 Beyschlag	
	1	R31 Resistor	1K ±2% SBC 0309 Beyschlag	
	1	R32 Resistor	2,4K ±2% SBC 0309 Beyschlag	
	1	R33 Resistor	15K ±2% SBC 0309 Beyschlag	
	1	R34 Resistor	15K ±2% SBC 0309 Beyschlag	
	1	R35 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R36 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R37 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R38 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R39 Resistor	22K ±2% SBC 0309 Beyschlag	
	1	R40 Resistor	22K ±2% SBC 0309 Beyschlag	
	1	S101-S801 Rotary switch	Type RBF 12F 2x6 CC prof ITT	
	8	S102 - S802 Toggle switch	DPDT 7201 SYCB Cok	
	8	S103 - S803 Toggle switch	DPDT 7203 SYCB Cok	
	8	S104 - S804 Toggle switch	DPDT 7203 SYCB Cok	
	8	S105 - S805 Toggle switch	DPDT 7203 SYCB Cok	
	8	S106 - S806 Toggle switch	DPDT 7203 SYCB Cok	

Def nr	Gruppvariant 4 3 2 1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	S1 Rotary switch	RBP 12F 2x6 NCC Prof ITT	
	1	S2 Rotary switch	RBP 12F 2x6 NCC Prof ITT	
	1	S3 Rotary switch	RBP 12F 4x3 CC Prof ITT	
	1	S4 Toggle switch	DPDT 7201SYCQ Cok	
	1	S5 Toggle switch	DPDT 7201SYCQ Cok	
	1	S6 Toggle switch	DPDT 8221/C Cok (with buttom 7089/3 red)	
	8	T101 - T108 Transformator	LL1515	Lars Lundahl
	6	T1 - T6 Transformator	64872	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64694	
		Circuit diagram	64852	
		Cover paint drawing	64683	
		Test procedure		
1	1	Printed board	64683	
2	53	Solder resist stripe	75302-001 Berg	
3	2	Handle	61198	
4	4	Screw	CSK-B2x6 STF 2 Kro. bl.	
5	1	Teflontube	UTW AWG NAR 20	
6	1	Copperwire	GLFT SM 0010-02 ⌀ 0,75 längd 15 cm	
	2	C101, C201 Capacitor	220uF/3V ETP 4 Ero	
	2	C102, C202 Capacitor	150pF GIZ 606 LCC Resista	
	2	C103, C203 Capacitor	150pF GIZ 606 LCC Resista	
	2	C104, C204 Capacitor	18 pF GIZ 606 LCC Resista	
	2	C105, C205 Capacitor	0,15uF ±5% MKT 1819 415/06 Ero	63V
	2	C106, C206 Capacitor	100uF/3V ETP 3 Ero	
	2	C107, C207 Capacitor	0,22uF ±5% MKT 1819 422/06 Ero	63V
	2	C108, C208 Capacitor	0,22uF ±5% MKT 1819 422/06 Ero	
	2	C109, C209 Capacitor	3,3nF ±5% FKS (FKC 3) Wima	Alt:KP 1835-233/16-1 OKAB
	2	C110, C210 Capacitor	33nF ±5% FKC 3 Wima	Alt: MKC 1862-333/016 ~~OKAB~~
	2	C111, C211 Capacitor	33nF ±5% FKC 3 Wima	
	2	C112, C212 Capacitor	0,15uF ±5% MKT 1819 415/06 Ero	63V
	2	C113, C213 Capacitor	3,3nF ±5% FKS (FKC 3) Wima	Alt: KP 1835-233/16-1 OKAB
	2	C114, C214 Capacitor	4,7uF/ 35V ETP 2 Ero	
	2	C115, C215 Capacitor	100uF/3V ETP 3 Ero	
	2	C116, C216 Capacitor	100uF/3V ETP 3 Ero	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	2	C117, C217 Capacitor	0,1uF ±10% 100V MKT 1819 Ero	
	2	C118, C218 Capacitor	0,1uF ±10% 100V MKT 1819 Ero	
	2	IC101, IC201 Integr. krets	SN 72709P Selected according to Spec.	Texas
	2	IC102, IC202 Integr. krets	HA 1-4741-5 Selected according to Spec.	
	2	R101, R201 Resistor	18k ±2% SBC 0309 Beyschlag	
	2	R102, R202 Resistor	4,7k ±2% SBC 0309 Beyschlag	
	2	R103, R203 Resistor	1,1k ±2% SBC 0309 Beyschlag	
	2	R104, R204 Resistor	330 ohm ±2% SBC 0309 Beyschlag	
	2	R105, R205 Resistor	100 ohm ±2% SBC 0309 Beyschlag	
	2	R106, R206 Resistor	10k ±2% SBC 0309 Beyschlag	
	2	R107, R207 Resistor	10k ±2% SBC 0309 Beyschlag	
	2	R108, R208 Resistor	1,5k ±2% SBC 0309 Beyschlag	
	2	R109, R209 Resistor	820 ohm ±2% SBC 0309 Beyschlag	
	2	R110, R210 Resistor	1,8k ±2% SBC 0309 Beyschlag	
	2	R111, R211 Resistor	3,9k ±2% SBC 0309 Beyschlag	
	2	R112, R212 Resistor	10k ±2% SBC 0309 Beyschlag	
	2	R113, R213 Resistor	1,5k ±2% SBC 0309 Beyschlag	
	2	R114, R214 Resistor	7,5k ±2% SBC 0309 Beyschlag	
	2	R115, R215 Resistor	11k ±2% SBC 0309 Beyschlag	
	2	R116, R216 Resistor	10k ±2% SBC 0309 Beyschlag	
	2	R117, R217 Resistor	5,1k ±2% SBC 0309 Beyschlag	
	2	R118, R218 Resistor	1,5k ±2% SBC 0309 Beyschlag	

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	2	R119, R219 Resistor	33k ±2% SBC 0309 Beyschlag	
	2	R120, R220 Resistor	2kohm ±2% SBC 0309 Beyschlag	
	2	R121, R221 Resistor	6,8kohm ±2% SBC 0309 Beyschlag	
	2	R122, R222 Resistor	470k ±2% SBC 0309 Beyschlag	
	2	R123, R223 Resistor	2,2k ±2% SBC 0309 Beyschlag	
	2	R124, R224 Resistor	1,5k ±2% SBC 0309 Beyschlag	
	2	R125, R225 Resistor	2,4k ±2% SBC 0309 Beyschlag	
	2	R126, R226 Resistor	2,4k ±2% SBC 0309 Beyschlag	
	2	S101, S201 Rotary switch	RBP 12F 2x6 NCC prof. ITT	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64695	
		Circuit diagram	64852	
		Cover paint drawing	64684	
		Test procedure		
1	1	Printed board	64684	
2	58	Solder resist stripe	75302-001 Berg	
3	2	Handle	61198	
4	4	Screw	CSK-B2x6 st Fz kro.bl.	
	1	C1 Capacitor	150pF GIZ 606 Lcc Resista	
	1	C2 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague
	1	C3 Capacitor	100uF/3V ETP3 Ero	
	1	C4 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C5 Capacitor	150pF GIZ 606 LCC Resista	
	1	C6 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague
	1	C7 Capacitor	100uF/3V ETP3 Ero	
	1	C8 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C9 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C10 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague
	1	C11 Capacitor	100uF/3V ETP3 Ero	
	1	C12 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C13 Capacitor	150pF GIZ 606 Lcc Resista	
	1	C14 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague
	1	C15 Capacitor	100uF/3V ETP3 Ero	
	1	C16 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C17 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	C18 Capacitor	47pF GIZ 606 Lcc Resista	
	1	C19 Capacitor	100uF ± 20% 20V 150D107X0020S	Sprague
	1	C20 Capacitor	47pF GIZ 606 Lcc Resista	
	1	1C1 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	1C2 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	1C3 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	1C4 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	1C5 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	1C6 Intergrated circuit	HA1 - 4741 - 5	Selected
	1	R1 Resistor	12K ± 2% SBC0309 Beyschlag	
	1	R2 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R3 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R4 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R5 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R6 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R7 Resistor	8,2K ± 2% SBC0309 Beyschlag	
	1	R8 Resistor	1,8K ± 2% SBC0309 Beyschlag	
	1	R9 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
	1	R10 Resistor	10K ± 2% SBC0309 Beyschlag	
	1	R11 Resistor	47K ± 2% SBC0309 Beyschlag	
	1	R12 Resistor	12K ± 2% SBC0309 Beyschlag	
	1	R13 Resistor	7,5K ± 2% SBC0309 Beyschlag	
	1	R14 Resistor	10K ± 1% SBC0309 Beyschlag	
	1	R15 Resistor	10K ± 1% SBC0309 Beyschlag	

Ordn nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant		Benämning	Beteckning	Anm
		1	R16 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R17 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R18 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R19 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
		1	R20 Resistor	8,2K ± 2% SBC0309 Beyschlag	
		1	R21 Resistor	1,2K ± 2% SBC0309 Beyschlag	
		1	R22 Resistor	47K ± 2% SBC0309 Beyschlag	
		1	R23 Resistor	12K ± 2% SBC0309 Beyschlag	
		1	R24 Resistor	43K ± 2% SBC0309 Beyschlag	
		1	R25 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R26 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R27 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R28 Resistor	10K ± 1% SBC0309 Beyschlag	
		1	R29 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R30 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
		1	R31 Resistor	8,2K ± 2% SBC0309 Beyschlag	
		1	R32 Resistor	1,2K ± 2% SBC0309 Beyschlag	
		1	R33 Resistor	47K ± 2% SBC0309 Beyschlag	
		1	R34 Resistor	12K ± 2% SBC0309 Beyschlag	
		1	R35 Resistor	12K ± 2% SBC0309 Beyschlag	
		1	R36 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R37 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R38 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R39 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R40 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R41 Resistor	8,2K ± 2% SBC0309 Beyschlag	
		1	R42 Resistor	1,8K ± 2% SBC0309 Beyschlag	

Ordn nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant		Benämning	Beteckning	Anm
		1	R43 Resistor	10K ± 2% SBC0309 Beyschlag	
		1	R44 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
		1	R45 Resistor	47K ± 2% SBC0309 Beyschlag	
		1	R46 Resistor	12K ± 2% SBC0309 Beyschlag	
		1	R47 Resistor	100 ohm ± 2% SBC0309 Beyschlag	
		1	R48 Resistor	100 ohm ± 2% SBC0309 Beyschlag	
		1	R49 Resistor	4,3K ± 2% SBC0309 Beyschlag	
		1	R50 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
		1	R51 Resistor	2K ± 2% SBC0309 Beyschlag	
		1	R52 Resistor	24K ± 2% SBC0309 Beyschlag	
		1	R53 Resistor	7,5K ± 2% SBC0309 Beyschlag	
		1	R54 Resistor	100 ohm ± 2% SBC0309 Beyschlag	
		1	R55 Resistor	100 ohm ± 2% SBC0309 Beyschlag	
		1	R56 Resistor	4,3K ± 2% SBC0309 Beyschlag	
		1	R57 Resistor	470 ohm ± 2% SBC0309 Beyschlag	
		1	R58 Resistor	2K ± 2% SBC0309 Beyschlag	
		1	R59 Resistor	24K ± 2% SBC0309 Beyschlag	
		1	R60 Resistor	7,5K ± 2% SBC0309 Beyschlag	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64697	
		Circuit diagram	64852	
		Cover paint drawing	64686	
		Test procedure		
1	1	Printed board	64686	
2	3	Rivet nut	KF2-M3 St PEM	
3	1	Socket-contact	1.13.006.801.00 Black K=20mm	Dunkel
4	1	Socket-contact	1.13.006.801.00 Blue K=20mm	Dunkel
5	1	Socket-contact	1.13.006.801.00 Red K=20mm	Dunkel
6	3	Nut	M6x0,75	Dunkel
7	3	Distanc tub	61168	
8	3	Casings	1.70.107-201.00	Dunkel
9	3	Nut	LB6LM 3	Fz + kro.
10	4	Screw	MCS 3x18 Nylon	
11	4	Nut	M3 Nylon	
12	1	Bundle band	SST 1M Panduit	
13	8	Pin	75401-002 Berg	
14	2	Bare wire	GLFT SM 0010-02 Ø0,75mm	length ca 13 mm
15	1	Voltage switch	61192	
16	1	Contact	43-2110-5 Elfa	
17	1	Angle	61178	
18	1	Angle	61177	
19	2	Screw	MCS 3x6 St	Fz + kro.
20	1	Fuse	6 5x20 mm 200 mAT	
21	1	Fuseholder	F 396 Bulgin	

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
22	25cm	Wire	RK 1x0,75	Yellow-gren
23	50cm	Wire	MKNB 1x0,75	Blue
24	1	Teflontube	210 mm (Ø5 inv.)	
25	2	Screw	FS 3x8 Fn *Black*	
26	3	Soldering tag	1107-0208 Aydel	
27	3	Wire lug	AMP 34142	
28	3	Lockwasher	Orginal-Schnorr lockwasher M3 fZ	
29	*1*	*Bare wire*	*GLFT SM 0010-02 Ø0,75mm*	*length ca 30 mm*
	1	C1 Capacitor	1000µF EG 1000/40 Roe	
	1	C2 Capacitor	1000µF EG 1000/40 Roe	
	1	C3 Capacitor	1,5nF GSZ 606 LCC Resista	
	1	C4 Capacitor	1000µF EG 1000/40 Roe	
	1	C5 Capacitor	1000µF EG 1000/40 Roe	
	1	C6 Capacitor	1,5nF GSZ 606 LCC Resista	
	1	C7 Capacitor	0,047uF/100V PFE280DA547 Rifa	or similar
	1	C8 Capacitor	0,047uF/100V PFE280DA547 Rifa	or similar
	1	D1 Diode	BS2 IR Nordqvist o Berg	
	1	D2 Diode	IN 974B	
	1	D3 Diode	PAB 2194	
	1	D4 Diode	BS2 IR Nordqvist o Berg	
	1	D5 Diode	IN 974B	
	1	D6 Diode	PAB 2194	

Det nr	Gruppvariant /4 /3 /2 1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	IC1 Intergrated circuit	uA 723PC alt. MC 1723CP	
	1	IC2 Intergrated circuit	uA 723PC alt. MC 1723CP	
	1	Q1 Transistor	BD 198 Motorola	
	1	Q2 Transistor	BD 198 Motorola	
	1	Q3 Transistor	BD 198 Motorola	
	1	Q4 Transistor	BD 198 Motorola	
	1	R1 Resistor	220 ohm ± 2% SBC 0309 Beyschlag	
	1	R2 Resistor	100 ohm ± 2% SBC 0309 Beyschlag	
	1	R3 Resistor	1,8 ohm ± 2% SBE 0414 Beyschlag	
	1	R4 Resistor	12K ± 2% SBC 0309 Beyschlag	
	1	R5 Resistor	10K ± 2% SBC 0309 Beyschlag	
	1	R6 Resistor	220 ohm ± 2% SBC 0309 Beyschlag	
	1	R7 Resistor	100 ohm ± 2% SBC 0309 Beyschlag	
	1	R8 Resistor	1,8 ohm ± 2% SBE 0414 Beyschlag	
	1	R9 Resistor	12K ± 2% SBC 0309 Beyschlag	
	1	R10 Resistor	10K ± 2% SBC 0309 Beyschlag	
	1	R11 Resistor	1K ± 2% SBC 0309 Beyschlag	
	1	R12 Resistor	1K ± 2% SBC 0309 Beyschlag	
	1	R13 Resistor	± 2% SBC 0309 Beyschlag	to be tested
	1	R14 Resistor	± 2% SBC 0309 Beyschlag	to be tested
	1	T1 Transformer	64961	

Phantom unit and dc-dc converter +48 V 64851

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64851	
		Circuit diagram	64852	
		Cover paint drawing	64690	
		Test procedure		
1	1	Printed board	64690	
2	4	Solder resist stripe	75302-001 Berg	
	1	C1 Capacitor	47uF 40V EBS 47/40 Roe	
	1	C2 Capacitor	47uF 40V EBS 47/40 Roe	
	1	C3 Capacitor	47uF 40V EBS 47/40 Roe	
	1	C4 Capacitor	22uF 63V EBS 22/63 Roe	
	1	C5 Capacitor	22uF 63V EBS 22/63 Roe	
	1	D1 Diode	1N4148	
	1	D2 Diode	1N4148	
	1	D3 Diode	1N4148	
	1	D4 Diode	1N974 B Zener 36V	
	1	D5 Diode	ITT 923 ITT	
	1	L1 Drossel	100µH 58-3070-8 Elfa	
	1	L2 Drossel	100µH 58-3070-8 Elfa	

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	R1 Resistor	4,7 ohm ±2% SBC 0309 Beyschlag	
	1	R2 Resistor	1k ±2% SBC 0309 Beyschlag	
	1	R3 Resistor	82k ±2% SBC 0309 Beyschlag	
	1	R4 Resistor	180 ohm ±2% SBC 0309 Beyschlag	
	1	Q1 Transistor	BD 530	
	1	T1 Transformer	64860	

Det Ar	Gruppvariant /4	/3	/2	/1	Benämning	Beteckning	Anm
	Antal per gruppvariant						
					Assembly	64698	
					Circuit diagram	64852	
					Cover paint drawing	64687	
					Test procedure		
1				1	Printed board	64687	
2				4	Solder resist stripe	75302-001 Berg	
				1	C1 Capacitor	33nF 5% 160V FKC 3 Wima [1]	Obs måste vara
				1	C2 Capacitor	33nF 5% 160V FKC 3 Wima [1]	Polykarbonad typ
						[1] Alt: MKC 1862-333/256 OKAB	
				1	IC1 Integrated circuit	RC 4558 DN	
				1	D1 Diode	1N4148	
				1	D2 Diode	1N4148	
				1	D3 Diode	1N756	
				1	R1 Resistor	270k ±2% SBC 0309 Beyschlag	
				1	R2 Resistor	82 ohm ±2% SBC 0309 Beyschlag	
				1	R3 Resistor	10k ±2% SBC 0309 Beyschlag	
				1	R4 Resistor	10k ±2% SBC 0309 Beyschlag	
				1	R5 Resistor	910k ±2% SBC 0309 Beyschlag	
				1	R6 Resistor	10k ±2% SBC 0309 Beyschlag	

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning		Anm
		Assembly	64700		
		Circuit diagram	(64852) 62197		
		Cover paint drawing	64691		
		Test procedure			
1	1	Printed board	64691		
2	6	Solder resist stripe	75302-001	Berg	
3	2	Mounting pads	7018-022	Jermyn	
	1	C1 Capacitor	10µF 35 V	ETP-2-E Ero	
	1	C2 Capacitor	4,7µF 35V	ETP-2-E Ero	
	1	C3 Capacitor	10µF 35 V	ETP-2-E Ero	Utprovas ±5%
	1	C4 Capacitor	0,1µF	PHE 280 DK 610 Rifa	
	1	D1 Diode	1N 4148		
	1	D2 Diode	1N 4148		
	1	D3 Diode	1N 751A		
	1	D4 Diode	1N 4148		
	1	D5 Diode	1N 4148		
	1	IC1 Integrated circuit	HA1-4741-5		Selected

Del nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
	1	Q1 Transistor	2N 2913	
	1	Q2 Transistor	BC 177 B	
	1	Q3 Transistor	BC 107 B	
	1	Q4 Transistor	2N 3819	
	1	R1 Resistor	6,8K ±2% SBC 0309 Beyschlag	
	1	R2 Resistor	3K ±2% SBC 0309 Beyschlag	
	1	R3 Resistor	1,5K ±2% SBC 0309 Beyschlag	
	1	R4 Resistor	6,8K ±2% SBC 0309 Beyschlag	
	1	R5 Resistor	470K ±2% SBC 0309 Beyschlag	
	1	R6 Potentiometer	500K 3006P-1-504 Bourns	
	1	R7 Resistor	10K ±2% SBC 0309 Beyschlag	
	1	R8 Resistor	270 ohm ±2% SBC 0309 Beyschlag	
	1	R9 Resistor	100K ±2% SBC 0309 Beyschlag	
	1	R10 Resistor	100K ±2% SBC 0309 Beyschlag	
	1	R11 Resistor	150 ohm ±2% SBC 0309 Beyschlag	
	1	R12 Resistor	150 ohm ±2% SBC 0309 Beyschlag	
	1	R13 Resistor	68K ±2% SBC 0309 Beyschlag	
	1	R14 Resistor	3K ±2% SBC 0309 Beyschlag	
	1	R15 Resistor	150 ohm ±2% SBC 0309 Beyschlag	
	1	R16 Resistor	2,7K ±2% SBC 0309 Beyschlag	
	1	R17 Resistor	1K ±2% SBC 0309 Beyschlag	
	1	R18 Resistor	1K KR 102C (NTC) ITT	
	1	R19 Potentiometer	2k 3006P-1-202 Bourns	
	1	R20 Resistor	180 ohm ±2% SBC 0309 Beyschlag	

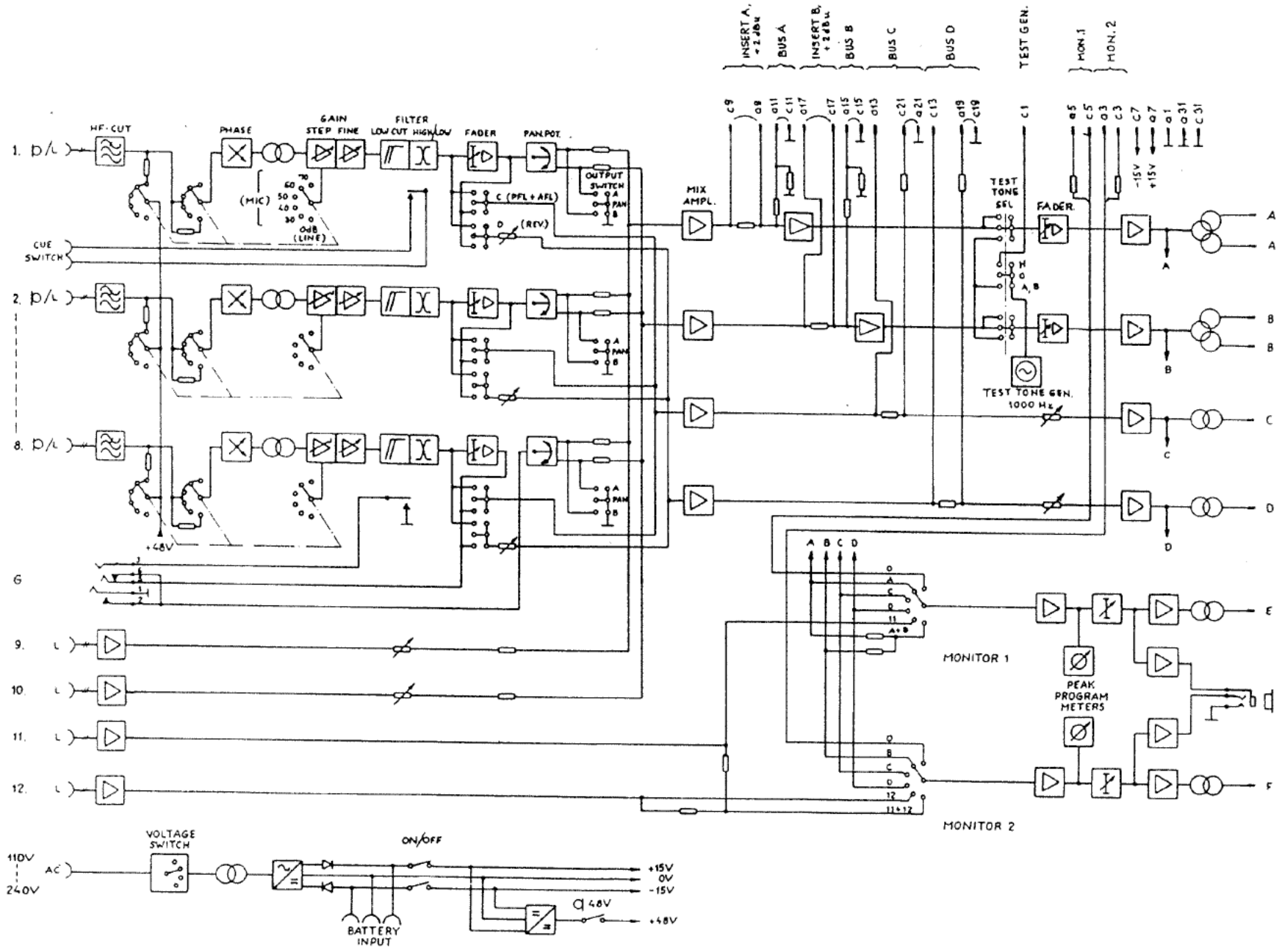
Led unit 64699

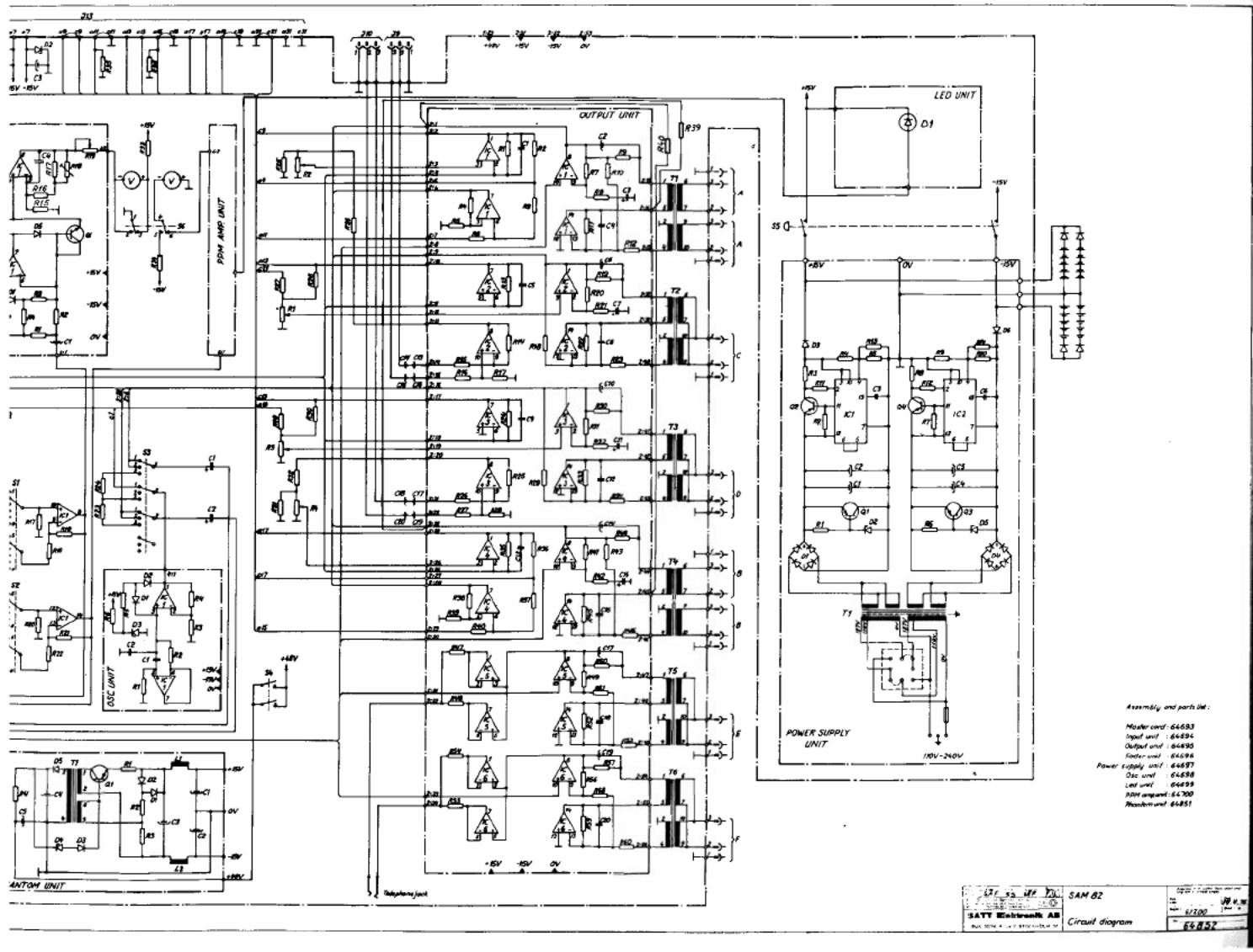
Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64699	
		Circuit diagram	64852	
		Cover paint drawing	64688	
		Test procedure		
1	1	Printed board	64688	
2	4	Tuberivet	RRN 1,5x3	
3	2	Spring	61175	
4	1	Copperwire	GLFT SM 0010-02 Ø 0,75 lÄngd ca: 17	mm
5	1	Teflontube	UTW AWG NAR20 Ø 0,8 lÄngd ca: 17	mm
	1	D1 Led	MV5253 Monsanto	(green 5 mm)
				(To glue with Araldit)

Fader unit 64696

Det nr	Gruppvariant /4 /3 /2 /1 Antal per gruppvariant	Benämning	Beteckning	Anm
		Assembly	64696	
		Circuit diagram	64852	
		Cover paint drawing	64685	
		Test procedure		
1	1	Printed board	64685	
2	44	Solder resist stripe	75302 - 001 Berg	
	1	R1 Potentiometer	10K LOG LM 4A-253 Waters	Cue switch without spring
	1	R2 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R3 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R4 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R5 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R6 Potentiometer	10K LOG LM 4A-220 Waters	Alt.: ~~04849~~
	1	R7 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R8 Potentiometer	10K LOG LM 4A-253 Waters	Cue switch without spring
	1	R9 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R10 Potentiometer	10K LOG LM 4A-220 Waters	
	1	R11 Potentiometer	10K LOG S1021-60713.006.10 GND	Ruwido } to cut off as
	1	R12 Potentiometer	10K LOG S1021-60713.006.10 GND	drawing 59961
	8	R13 — R20 Resistor	56K SBC 0309 Beyschlag	
	8	C1 — C8 Capacitor	4,7 uF 35 V ETP-2-E ERO	Alt.: 0,68 uF 63 V DC MKS2 WIMA

Block Diagram





Assembly and parts list:

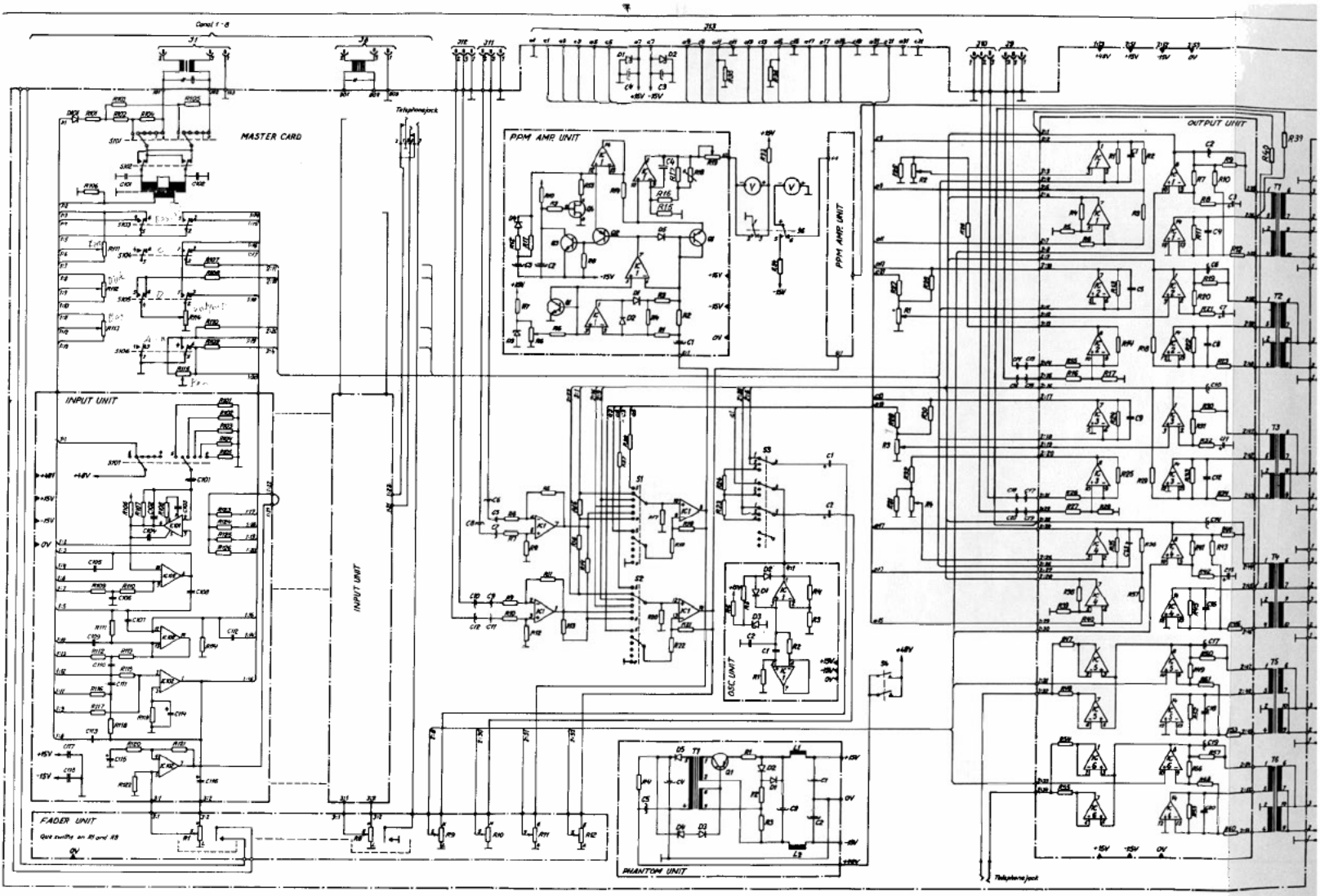
Master card	64693
Input unit	64694
Output unit	64695
Fader unit	64696
Power supply unit	64697
Osc. unit	64698
Led unit	64699
PAM expand.	64700
Phantom unit	64851

SATT Elektronik AB

SAM 82

Circuit diagram

64852


MASTER CARD
INPUT UNIT
INPUT UNIT
FADER UNIT
PPM AMP. UNIT
PPM AMP. UNIT
OSC. UNIT
PHANTOM UNIT
OUTPUT UNIT
Telephone jack
Telephone jack